

Australian Personal Computer

ISSN 0725-4115 NZ \$3.50
REGISTERED BY AUSTRALIA POST PUBLICATIONS VBP 3691

FEBRUARY 1986 \$2.95

Turn your
micro into
an answering machine

AUSTRALIA'S TOP SELLING COMPUTER MAGAZINE



THE MEGAMAC DROPS IN
Apple's expandable Macintosh appears

**NOW WITH
80286 & Z80H**

Universe

Security and speed
Software compatibility, and

Forget conventional networking. Universe provides superior speed and security necessary in multiuser applications. Running the widest range of 8 and 16 bit software, it has the ability to network IBM PCs and workalikes in the fastest multiuser/networking microcomputer system in the world.

Multiuser - efficiency

A single Universe runs up to 25 workstations, each with any combination of 8 and 16 bit programs. Advanced AED network technology allows expansion to 100's of users.

Multitasking - productivity

Each operator can use any four 8 and 16 bit programs at the same time. Switching screens takes only a single keystroke.

Networking - flexibility

Up to 255 MS-DOS machines. IBM PCs and workalikes can be linked into the Universe system using a high speed DR Net local area network.

IBM PCs and workalikes can run applications written for Concurrent PC DOS, CP/M-86 and PC-DOS, while having access to all the benefits of the network. PC users share files, records, printers and other network resources.

Software - compatibility

Dual processor design, provides access to the world's largest software base via CP/M, MP/M and MS-DOS. With AED's new Concurrent DOS you have the best of all worlds.

DMA hard discs and the new high-speed 80286/Z80H dual processor CPU furnish performance necessary to handle multiple 8 and 16 bit programs.

Tough

The Universe is built on a strong square tube frame.

Stays Cool

No fancy operating environment needed. Every Universe is tested at 42 degrees C.

Flexible

Universe accepts an extensive range of terminals, printers, modems, even electronic telex.

Expandable

20 slot shielded S100 buss. Obsolescence proof using IEEE 696 S100 cards.



Speed and Security - essential to your business

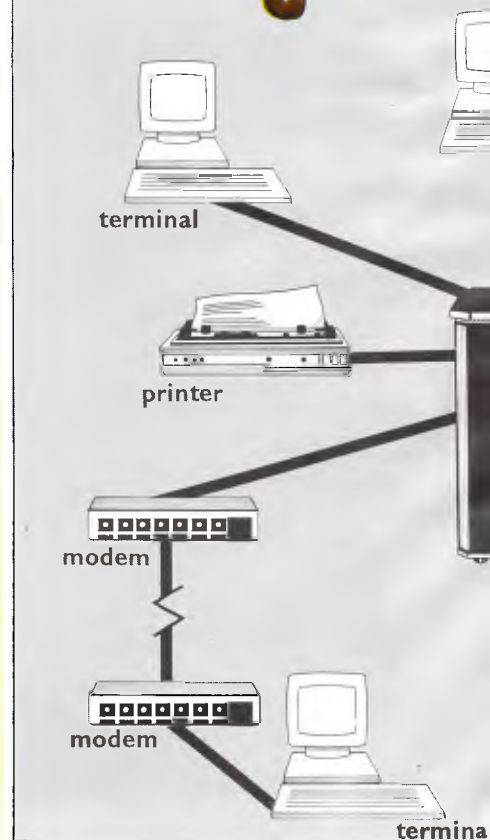
Most networks are slow and insecure. Universe shines here, with full multilevel security enhancements normally found on well engineered minicomputers. Universe is engineered from the ground up to provide facilities essential for the smooth running of a large multiuser system.

Important Security features

Encrypted login passwords. Users are restricted to specific terminals, directory areas, programs and nodes on the network.

File passwords. File and record lockout and a full password hierarchy. Your System Manager can quickly and easily configure the system so that each terminal only has access to those facilities and data its operator needs. For example:

- Option to restrict any account to specific programs or workstations



Multiuser

of a minicomputer.
reliability of a supermicro.



Smart

Powerful file I/O processor makes Universe operation faster, leaving the CPU free of repetitive tasks.

Fast

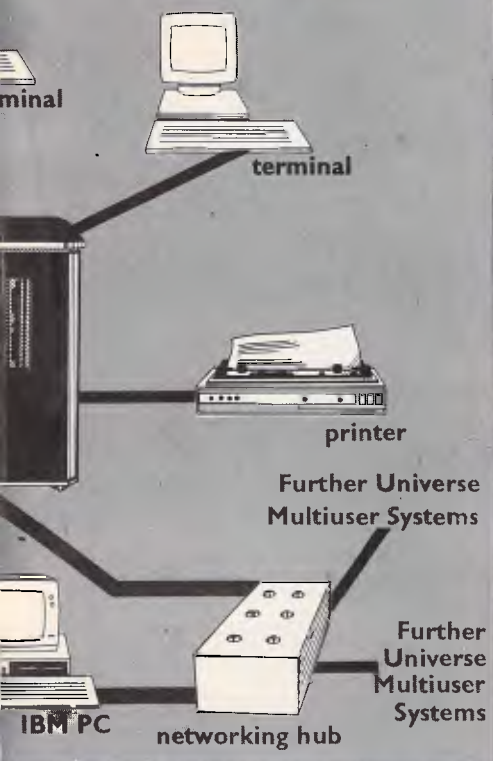
High speed (8MHz) dual processor design (80286 plus Z80H) with options for 68000, 16032 etc.

Durable

Ebony glass top and acrylic epoxy finish

Capacity

3 Winchesters plus removeable cartridge totalling up to 300 Megabytes total storage.



- Files may be automatically dated for future reference. Optional timestamping shows both creation and last access.
- Optional passwords on computers within a local area network.

Operating features

- Low cost serial terminals support both 16 bit (CP/M, Concurrent DOS, MP/M-86) and 8-bit (CP/M, MP/M II) software
- 200 character type-ahead buffer per terminal
- Fast 'hashed' directory searches
- A secure electronic mail facility. Optional electronic Telex.
- A multiuser appointment calendar
- Optional 8087 maths coprocessor
- Inter-terminal communication. Electronic mail is here!
- A programmable keys utility so users can redefine their keyboards
- Optional telecommunications with remote computers via modem

Full Field Support

We were the first company in Australia to introduce full 12 month on-site maintenance (now extendable to 2 years at time of purchase). All service and engineering support is carried out by AED directly.

Australia wide network

Field service is presently within 24 hours on the east coast and within 48 hours for country areas.

Our network is being aggressively expanded.

Inherent high reliability and modular construction minimize downtime and make service to the most remote locations feasible.

Customer support

Our very first system buyer is still a valued customer. We take special pride in supporting every existing customer and in providing the highest standard of service at every stage. As part of this support, the Universe is continually being refined in response to the needs of existing customers and Australian business.



NSW: AED System Developments Ltd.
Unit 3, Prospect Industrial Centre,
2 Stoddart Road, Prospect NSW 2149.
Ph: (02) 636 7677. Telex: AA 70664

The Computer Factory, 214 Harbord Road,
Brookvale 2100. Ph: (02) 938 2522

ACT: AED Computers (Canberra).
217 Northbourne Ave, Canberra 2601
Ph: (062) 47 3403. Telex AA 62898

VIC: AED Computers (Melbourne).
53 Waverley Rd., East Malvern 3145.
Ph: (03) 211 5542 Telex AA 30624

WA: Computer Services of WA. 465 Canning
Highway, Como 6152. PO Box 22 Como 6152.
Ph: (09) 450 5888

APC

CONTENTS

Volume 7, Number 2, February 1986

REGULARS

5 NEWSPRINT

Events, people, software, hardware and opinions; Guy Kewney writes.

32 BANKS' STATEMENT

Our columnist takes Apple to task with the aid of the wandering shadow of Charles Babbage.

67 YANKEE DOODLES

The US angle is taken by correspondent David Ahl.

82 LETTERS

Correspondence on everything under the sun.

97 SUBSCRIPTIONS

The author of this diatribe's been looking at too much late-night television.

106 SCREENPLAY

Arcade action comes to your micro — Stephen Applebaum dares and wins ...

119 TJ'S WORKSHOP

The final instalment of the current format of our hints and tips section.

151 SUBSET

Machine code routines from David Barrow.

160 BIBLIOFILE

This month's book range includes a real \$140.95 encyclopaedia for programmers; David Taylor tells you what it's worth.



162 BACK ISSUES

Invest in the past: a guide to what's available in APC's past.

167 COMMUNICATIONS

Computer communications under the eye of correspondent Steve Withers.

168 END ZONE

The APC information service: includes computer chess, User Groups Update, Diary Data, Numbers Count and Lazing Around.

170 BLUDNERS

Where we correct the error of our ways.

173 PROGRAMS

Polished programs for popular machines.

188 CHIPCHAT

Another memo from marketing appears — what's the problem this month?

191 ADVERTISERS' INDEX

Where to find that product, who makes it, and how to get hold of it.

Editorial Managing Editor Sean Howard; Assistant Editor Maria Bokic; Consultant Editors Steve Withers, Ian Davies. Advertising Advertising Manager Mark Reiss; NSW and Qld Sales Manager Gerard Kohne (02) 264 1266; Vic, SA, WA and Tas Sales Manager Jenny Gold (03) 531 8411. Production Graphic Heart Pty Ltd. Distribution Subscriptions Manager Judy Welsh (02) 264 1266; Subscription rates Australia \$35 per annum, overseas A\$47.00 (surface) A\$130 (airmail); Newstand sales Network Distribution Co. 54 Park Street, Sydney 2000. Publishers Computer Publications Pty Ltd (a subsidiary of Consolidated Press (Holdings) Ltd).

Sydney: 215 Clarence Street, Sydney 2000; telephone (02) 264 1266; telex AA 20514 CON-PRES. Melbourne: 77 Glenhunting Road, Elwood 3184; telephone (03) 531 8411; telex AA 30333 'AMJ'.

Printed by Quadricolor Industries Pty Ltd. Material contained within *Australian Personal Computer* is protected under the Commonwealth Copyright Act 1968. No material may be reproduced in part or whole without written consent from the copyright holders. Produced under licence from Computing Publications and VNU Business Publications B.V.

All good things . . .

Well over two years ago we increased *APC*'s price from \$2.50 to \$2.95. Since that issue back in 1983, we've managed to maintain the single issue cost at that figure. But on top of inflation over the last two and a half years, the fall in the value of the Australian dollar has caused a massive increase in the price of gloss paper on which *APC* is printed. And so it is with regret that we announce the third cover price increase in the six year life of the magazine to \$3.50, effective from the next issue.

All is not gloom though: a number of changes and enhancements are planned from the March issue to make *APC* an even more exciting package and to maintain *APC* as by far Australia's top-selling computer magazine.

FEATURES

68 'I THINK THEREFORE I AM'

Noel Williams gives a reasoned answer to the question of Computer Life.

72 COMDEX REPORT

The world's biggest computer trade show filled Las Vegas again. Peter Jackson spots the trends in a picture report.

98 SUICIDE CHESS

Chess in reverse needs a different kind of programming, explained by John White.

104 INNOVATION '86

In this unique competition, your idea for the perfect micro upgrade product could win you an Olivetti M24 with hard disk from Dick Smith Electronics.

109 NUMBER CRUNCHING

Howard Oakley's software unleashes the power of the processor.

145 SEGMENTED ARCHITECTURE

The new processors need new memory structures, explained by Bill Unsworth.

157 INTERPRETATIVE LOGO

Harvey Mellor rounds off his series on Logo by explaining how to write an interpreter.

164 BENCHMARK COMPARISON

The new whiz-bang machines fail to oust an old favourite as the fastest micro around.

BENCHTESTS & REVIEWS

26 COVER STORY: MACINTOSH PLUS

Late extra — Nick Walker examines Apple's long-awaited megabyte Mac, and finds changes both internal and external.

36 QUATTRO

A new 4x4 multi-user machine from ICL. Nick Walker checks it out.

46 XTREE

Ian Davies checks out a directory manager for users with hard disks or a love of subdirectories.



49 CURTAIN UP . . .

Roll up, roll up for the best micro show in town. Richard Rydge previews the main event.

54 MACLION

Our regular database review concerns a powerful package on the Macintosh.

90 SMART ANSWERS

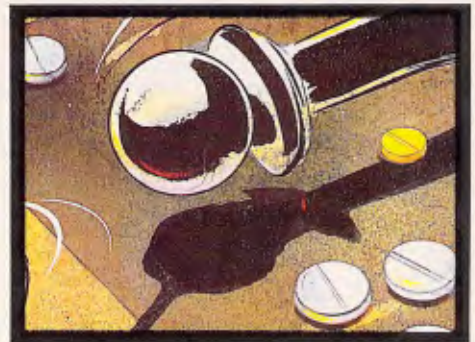
Turn your PC into a very smart telephone answering machine which digitizes, then records messages on disk. Ron Dunn elaborates.

131 ALL AT C?

As C moves from systems programming into the real world, Mike Liardet examines two user-friendly versions of the language.

139 OPTICAL MOUSE

The infamous mouse teams up with the Commodore 64 — Andrew Farrell assesses the combination.





See things more clearly with Roland monitors

Roland... the clearest resolution to all your monitor needs.

The CD 240 is a 12" super high resolution RGB monitor, specifically designed for the most demanding Computer Aided Design and business applications. Incorporating the latest technology, it allows extremely intricate screen images to be precisely displayed. With a 720 dot x 400 line pixel resolution, a .31 dot pitch and 25KHz scan rate, the CD 240 produces a brilliantly sharp image. Utilising the STB Super Res. 400 board, this monitor is totally compatible with all IBM Personal Computers and provides the additional benefits of a non-glare display. The dark glass, black matrix screen, ensures exceptional contrast and precise delineation of characters.

Rolands' CC 121 12" RGB monitor (640 dots x 240 lines) has been designed specifically for all standard IBM color

graphics software. Producing true color on a sharply contrasted background, and crystal clear displays of either text or intricate graphics, it is compatible with the IBM PC, XT and AT, Apple II and most other microcomputers.

Rolands' MB 142 14" monochrome monitor provides a unique video display for IBM PC users. The special low eye strain qualities of this Black and White monitor make it the ideal choice for intensive office and administrative applications. The large size screen combines a rock steady image with (25MHz bandwidth) fine character resolution and paper white phosphor which accurately reproduces the naturalness of the printed word.

Rolands' 12" MA 122 IBM compatible and MA 121 composite monitors are available in either green or amber phosphors and feature an anti-glare screen for low level eye strain.

Contact Roland DG for the name of your nearest dealer who will provide full technical information and a product demonstration.

Roland Corporation Australia Pty. Ltd.

50 Garden Street
South Yarra Victoria 3141
Telephone (03) 241 1254
Facsimile (03) 241 1257

23 Cross Street
Brookvale N.S.W. 2100
Telephone (02) 938 3911
Telex 277 69

Roland DG New Zealand

1 Ngairu Avenue
Epsom Auckland.
P.O. Box 36-045
Telephone (9) 50 4046
Telex N.Z. (74) 60555

Roland 

Reality is the cause of shattered dreams, in the case of the Commodore Amiga, and the truth about Comdex 1985 is revealed. Guy Kewney brings you the news that counts.

The dream to suit the reality

After the launch of the Commodore Amiga, a great change came over the world. Apparently, regular readers of this column have lost all faith in the objectivity of its author. The reason, I gather, is simple: the expressions of enthusiasm printed in APC under my name made it sound as if I'd sold out.

These people will be relieved to hear that the honeymoon is over.

No, I still love the Amiga, and still believe it is a big step in the right direction. But no longer is it the love of my dreams — I've attended a big convention of software developers, and learned too much about the machine's flaws.

Well, of course it has flaws! What on earth (you might reasonably ask) did I expect?

Share my disillusion to the full, before we try and retrieve some of our dreams.

Firstly, the multi-tasking operating system, Amiga-Dos, is not the real thing.

Next, the amazing piece of data-moving hardware, the 'blitter', which moves and transforms strings of bits, isn't available to serious computer programs after all. It's restricted to display tricks.

Thirdly, the inspiring specifications of the Tecmar add-on disk and memory, pre-announced by Commodore (in good faith, I believe) turn out to have been fairy stories.

Fourth, the plans for the future look to be creeping out too slowly: hard disks, memory expansion, improvements, are all going to be

too little, and not soon enough.

And fifth, and most bitter to swallow: Commodore, the huge company whose 'resources' were constantly quoted as being the reason Amiga would succeed where Atari would fail, whose marketing expertise would triumph; this giant mega-corporation, this commercial deity, has feet of clay. Commodore is in a state of serious financial embarrassment.

Let's start with the harsh financial position.

On the days which followed Comdex last November, I travelled, as widely as the APC budget allowed, around the West Coast of the US hunting Amiga software.

What I found was not only software, but fear. Not only among the observers and rivals of Commodore, but in its own corridors, there is genuine fear that the company is in trouble financially — and not just a little trouble, but the kind of trouble that might lead it to offer Amiga for sale.

'Don't tell anybody I said this,' commented one very senior executive, 'but if you know anybody with a few million to spend, try to persuade them what a good investment Amiga would be.'

At the time of writing, Commodore has had to default on some bank loans and reschedule new payments. Commodore believes that it can get back into the black, and has based its repayments along those lines. Financial observers take it as read that Commodore is being over-optimistic, and that it doesn't stand a chance.

Reasons for scepticism aren't hard to find.

For a start, a lot of Commodore's hopes rest on the prospect of good sales of the 128, and the recovery of the 64 sales.

That's not necessarily ridiculous. Apparently outrageously obsolete machines can still sell well, providing the maker puts a little effort into updating them. It could be argued that the 128 is an updated version of the 64. On the other hand, it could be argued that that argument is what Douglas Adams calls a 'load of dingo's kidneys'. Without a crystal ball, who knows? — but you can see why the banks are nervous.

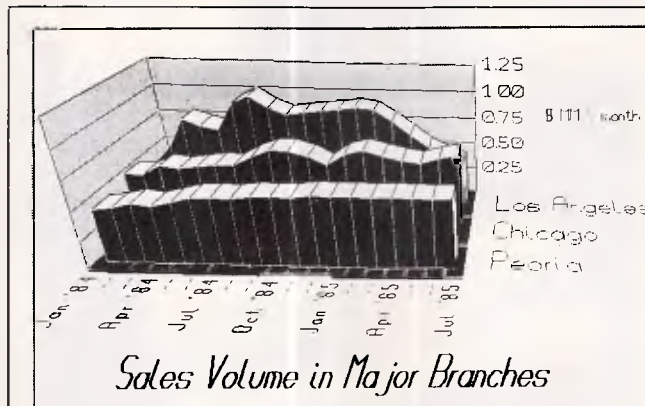
The other hope of money rolling in is, of course, the Amiga itself. To sell well, the Amiga needs two things: lots of software, and lots of Amiga computers.

Production of Amigas has been slow to get going. By the middle of December 1985, informed sources would estimate that Atari had shipped 50,000 ST models, with another 40-50,000 due by mid-January. The best bet for Amiga production by that time was just over 10,000 — around a quarter of Atari's total. Sales of that level won't save Commodore. It has to aim for five... probably 10 times that level.

And the unanswerable question is: when Commodore makes five times as many machines, will they sell?

As of today, there isn't a lot of software. There is a communications program, Maxicomm, from Mike Lehman's Maxicorp. 'Nobody likes it,' he told me candidly, 'but it's the only one in town, and we'll be improving it.' Nice for Mike, but tough for the rest of us.

Commodore didn't appear at the Comdex exhibition.



Apparently, this type of text (the labels on these graphs), in 'perspective', has never been previously possible on anything short of a big mainframe.

So says The Grafex Connection, a Palisades, California company, launching 3D Graph. I have the company's word for it that this 'provides a more meaningful graphics interpretation of numerical data than any other PC software currently on the market.' It costs \$US295, and details are available in the US on (213) 459 7949.

Guy Kewney

There's dissent about whether the company planned it, or if it didn't, why it didn't. Atari made complete fools of Commodore, displaying the famous 'bouncing ball' demo on an ST and doing it rather better (visually).

But Commodore stayed away deliberately, for two excellent reasons that made Atari's coup irrelevant. Firstly, there wasn't the money spare. And secondly, just as important, it would have looked rather foolish with a machine and no software to speak of.

By the end of February, there'll be a lot of excellent software. Electronic Arts has already published Deluxe Paint, a graphics and animation program that Jay Minder, the man who designed the Amiga chips, says is 'what this machine is all about,' and says it with tears in his eyes. It's a magnificent program.

It plans to follow that up with a series of related products, culminating in Deluxe Video Construction Set, all of which will make it possible to design pseudo animated cartoons for the machine. No other computer will be able to match this.

Maxisoft is pushing on with its plans to get a range of spreadsheet, database, word processor, and so on, into the market by the end of February. Mike Lehman has done a deal with Electronic Arts, whereby it will distribute his software as an 'affiliated label' even though it isn't entertainment software (or anything like it).

Games on the Amiga are due from Electronic Arts and Activision, in some quantity. Initially, these will tend to be conversions of games seen on other machines (Skyfox, Financial Cookbook, One On One, basketball, and so on), but new games like Return to Atlantis, which I saw in development at Electronic Arts, look to start using Amiga's animation rather more seriously.

Others are coming along,

but you wouldn't expect a catalogue of programs comparable with established machines. And so far I still don't know of a worthwhile text editor (Textcraft is barely adequate for letter writing); nor a good database manager.

At the moment, the sheer attraction of the computer is persuading certain special people to buy it for its own sake. At some stage, these 'propeller-heads' will all have one; at that stage, there had better be enough software around to attract serious users.

Probably, at the current rate of production, that stage won't arrive for a few months. The result is that you virtually can't get an

Amiga in the States — the propeller-heads are still standing in line to buy them, and they are on allocation. But at high production rates, there may be unsold Amigas on shelves, which would frighten Commodore's financial backers enormously.

'We have to decide where our heart is,' said a very senior Commodore executive, unhappy at the way things are going. 'We have to decide whether we are pushing this machine out into the marketplace, with all the resources it needs to be a success, or whether we're trying to be respectable. I think that at the moment, our bankers wouldn't dare make us bankrupt, and we should use our revenue to

do what has to be done to the machine. We should not sacrifice the machine, we should not simply concentrate on paying off debts until they feel that they can bankrupt us safely.'

The biggest flaw in this multi-tasking micro is that the operating system can't be protected from other programs. Nor can programs be protected from each other.

That's nothing new. No single-tasking micro available today has those features, either. But we expected so much from the Amiga that the sounds of illusions crashing to the ground became quite deafening, at the Eastbourne conference. 'That's bad programming!' insisted one programmer from Living Software. 'I can't seriously try to sell a machine like this to business users,' agreed a writer from Pilot Software.

It sounds silly, but — why not? Stand up the user whose IBM PC doesn't regularly, and at least three times a week, suddenly decide that it doesn't have a keyboard, and you can dance on Control-Alt-Delete if you like the rattling noise, but it's going to ignore you — and all your files are going to be left open, somewhere on the disk. It happens all the time, and after a while you learn to avoid the traps that commonly cause the problem.

'Well, yes,' said another programmer sadly. 'Just this morning, the office called me to say that the system had seized up and we'd lost two weeks work on the accounts, back to when we backed up the hard disk.'

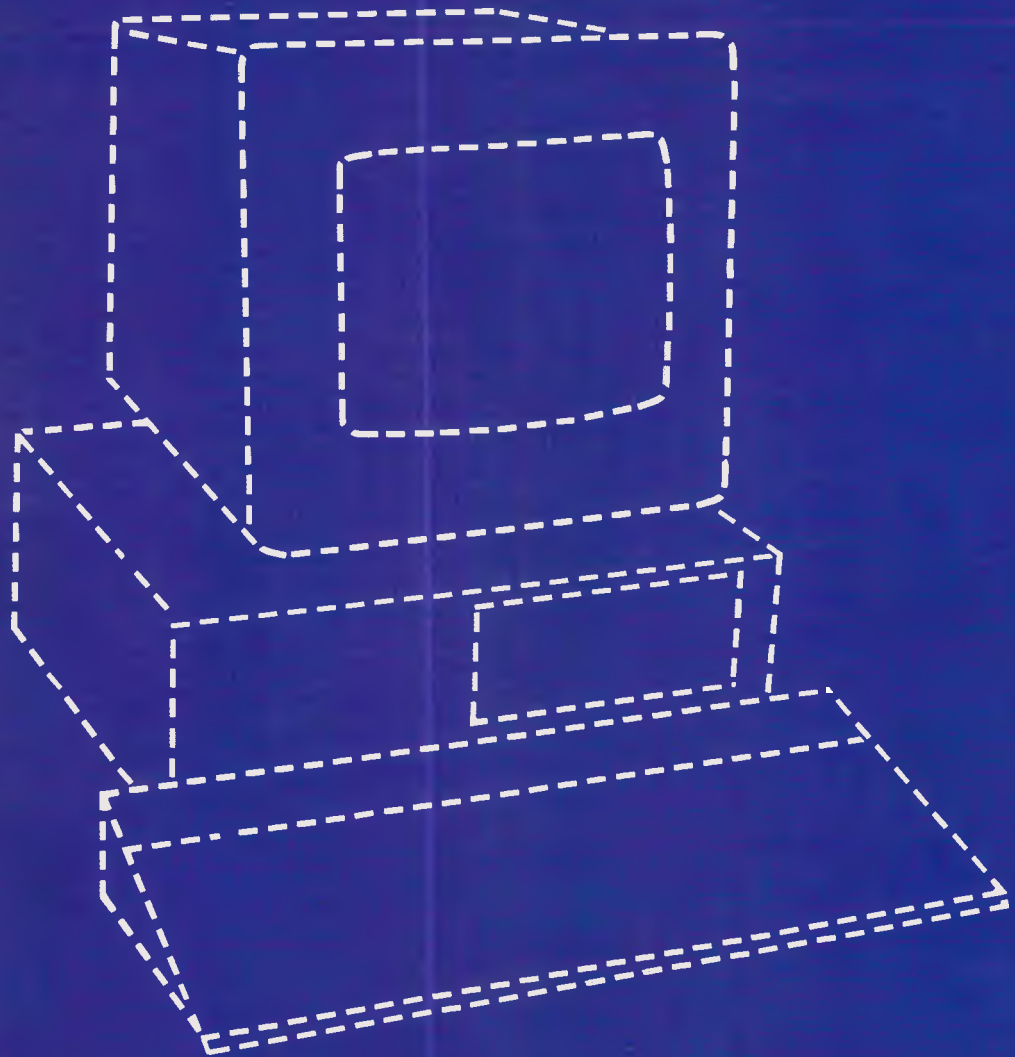
But that type of thing is what we were all hoping Amiga's multi-tasking operating system would sort out, and we find it hard to forgive the machine of our ultimate dreams.

Silly of us: it can't be done on a Motorola 68000 chip unless you have a memory management chip built in, and an operating system



Tandy's model 3000 is said to be AT-compatible, but smaller in terms of desk space than the IBM version. Apparently this system is compatible with IBM's AT and with the Tandy 1000, which implies (to my simple mind) a degree of compatibility with either machine that falls short of total. You have to make up your mind, Tandy: which?

Guy Kewney



**THE PERFECT
PERSONAL COMPUTER
FOR YOU
HASN'T BEEN BUILT YET.**

which uses memory management to protect one program from another.

The Amiga, to get speed, and to cut costs, has no memory management chip.

More seriously, its other big plus turns out to be an illusion: the bit blitter is not available to business software users.

The bit blitter is an amazing bit of Jay Miner design. It takes an indefinitely long bit pattern from memory and moves it all to a new location in memory, changing it according to a few logical rules without interrupting the central processor chip, at incredible speed.

It was originally designed as a trick chip for animation, which is what it does very well — taking images and moving them around the display areas, and changing colours, and so on.

Many data processing hacks, however, started drooling over that bit of hardware, due to the things it could do to help them with file manipulation, fast special arithmetic, spreadsheet shifts, and heaven knows what else. Bob Pariseau at the Los Gatos headquarters of Amiga says that programmers are already starting to do amazing indeterminate-length arithmetic with the blitter. 'With just a little more arithmetic logic in it, it would make a great vector processor,' he has discovered.

Unfortunately, because it was designed as a graphics chip, Amiga restricted it to a 19-bit address bus, which means it can only use 512k of memory. It was also wired up in such a way that 512k can only be the video memory — you can't point the blitter to the other 8Mbytes of addressable system memory.

At the time, this seemed reasonable enough. Most people in those days thought that 16k was quite generous for display memory, and putting in half a megabyte must have seemed like

looking to the future in a grandiose style.

To give a measure of just how generous it was, you have to know a piece of history. As little as 18 months ago, Amiga was the scene of a battle between those designers who wanted to make it a 64k system, and those ambitious fools who wanted 128k. 'Let's do the 128k system,' it was eventually decided, 'then we can run Unix...'

But the 68000 is a memory-hungry chip. The 'typical' application on Amiga takes 180k. Future applications, with ambitions to really turn computing on its head, will probably run out at 512k each, with data storage for tables, pictures, animation, and so on. Try to run concurrently and you're talking about three, four or five half-megabyte systems.

The screen display area will seem far from generous when they're all trying to keep animations in 512k, and the fact that data has to be moved into the screen area before it can be displayed will drive programmers crazy. Of course,

if they have only 512k systems, there won't be a problem — except the problem of not having enough memory to do those really amazing things that the machine has made them dream of.

It's clear that what the average user, this time next year, will expect, is a 2Mbyte (minimum system) box, with a built-in 30Mbyte (minimum size) hard disk and a protected operating system.

Unless Commodore changes its plans, however, what we will actually get will fall rather short. The operating system will be upgraded, but only to assume 1Mbyte of memory. There will be a hard disk, but the current plans aren't for a really big one. And the new blitter won't be rushed through to be ready in time.

In the interim, there is the Tecmar memory expansion and disk add-on.

To describe this as 'disappointing' is to waste a perfectly good opportunity to use the word 'disgusting'.

When I first wrote about the Amiga, Commodore told

me it would have a Tecmar add-on box, with 2Mbytes of RAM and 20Mbytes of disk, for \$2000. Subsequently, it turned out that this might only include another 512k, but would have empty sockets for the other 1.5Mbytes.

What we actually have is a 20Mbyte disk which is desperately slow (at least, the prototype I saw at the developers' conference was slow) and costs \$3500. With 1Mbyte of RAM memory, the price increases to \$4500.

Seriously, with hard disks costing around \$200 for bulk purchases of mechanisms, and 256kbit RAM chips costing under \$2, this has to be described as a cynical price. At \$2000 for the package, the profit margin would be more than healthy, and users would have legitimate grounds for complaint that performance didn't match the price. At \$4500, what we have is monopoly abuse.

That's about as bad as I can make the news sound. On the side of optimism, however, there is quite a bit.

Best news of all is that Commodore has finally accepted the idea that 'it would be nice to sell these Amiga chips to other system builders.'

At the moment, it isn't possible to take an Intel 80286 chip (as used in the IBM AT) and plug it into a computer board with the Amiga chips on. The Amiga chips are built around the clock/timing and addressing modes of the Motorola 68000, and would get in the way of the 80286. But even that alteration to the basic silicon is being considered, and looks feasible, technically.

But it certainly looks as though computers with the Amiga standard display will be available, with a variety of operating systems, from other manufacturers at some time in the future. And if someone puts a 68020 chip with memory management



I guarantee that you will see this on portable devices soon. From Epson, invisible in this picture, is a transparent electrode overlay for LCD screens. It can tell which bit you're touching, and software can then respond.

Technically, there are two ways of spotting your finger. One is a matrix of transparent 'wires' where your finger connects row to column. The other, rather sneakier, has a resistance along one side, and measures the voltage.
Guy Kewney

Hewlett-Packard will build yours after consulting the expert – you.



Announcing the Vectra PC concept – true flexibility to tailor the perfect solution to your needs.

Because in business, no two individuals have exactly the same needs, Vectra has been created to allow you to buy a PC tailored to suit your specific requirements. It offers enormous scope in terms of hardware and software applications and enables you to select the power, speed and memory capabilities that are right for you. Plus you have the option of using the Touchscreen facility or HP Mouse.

As Vectra is compatible with the IBM PC/AT, you can choose from thousands of popular business software programs – right off the shelf.

Vectra is the powerful PC that can grow with you. Its modular design means that future system expansion will be easy.

Vectra is so flexible it can be virtually

anything you want it to be. Its arrival presents an ideal opportunity for you to invest in HP's renowned technical excellence at a competitive price.

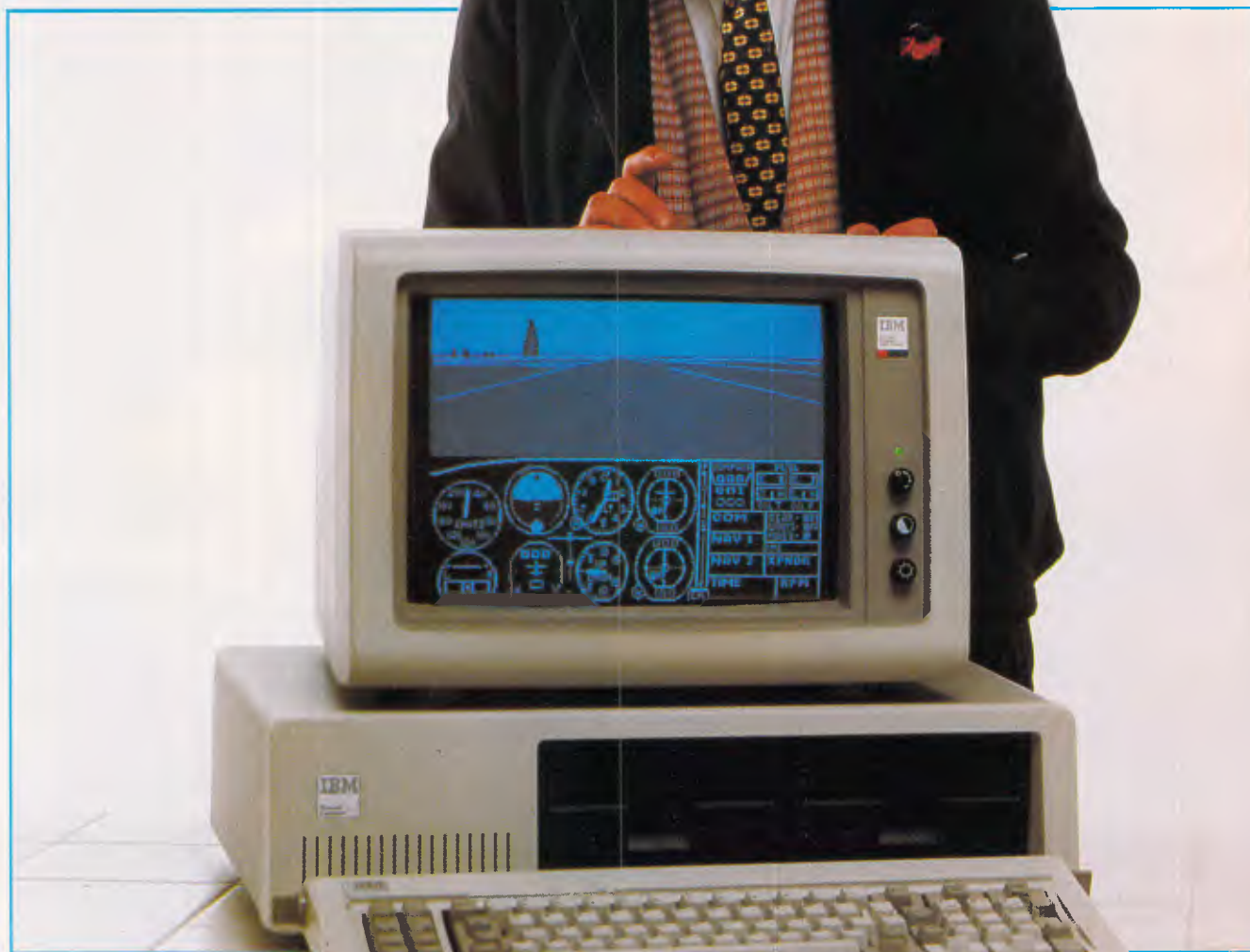
Find out how the Vectra PC can fit your needs by calling your local authorized Hewlett-Packard dealer or Hewlett-Packard direct.
Melbourne (03) 8952895 Sydney (02) 8884444
Adelaide (08) 2725911 Perth (09) 3832188
Brisbane (07) 304133 Canberra (062) 804244

Vectra
**HEWLETT
PACKARD**

Leo Burnett 7696 HEP 90533/B

The Logitec Comp like You k

—except



At last there is a compatible PC that combines a low price with uncompromising quality.

Fully compatible or your money back

New Logitec PC will run any IBM compatible software or your money back.

Twice the IBM warranty

IBM give you only three months warranty as standard. We give you six months full parts and labour warranty.

Japanese reliability

Open up a Logitec Compatible PC and you will

be pleased to find a Personal Computer built to exacting standards. The Japanese have a well deserved reputation for reliability and quality in the 'High Tech' area. Logitec uses components built and manufactured by Japan and the world's most respected corporations.

Low prices

Our standard PC comes with a 360K Disk Drive, 256K RAM, 130 Watt Power Supply, Keyboard, 2 Serial RS232 Ports & 1 Parallel Printer Port on the Main Board, and a Colour/Mono Graphics Controller.

Compatible PC is a lot now who's

for the price.



Don't delay. Call a
dealer near you for
more information.

Take that home with you for only
\$1950 including Sales Tax.

Optional features

You can of course have dual disk drives or 10 and 20 Megabyte hard disk drives to bring your PC up to 'XT' specifications at unbelievably low prices.

Phone now for free software.

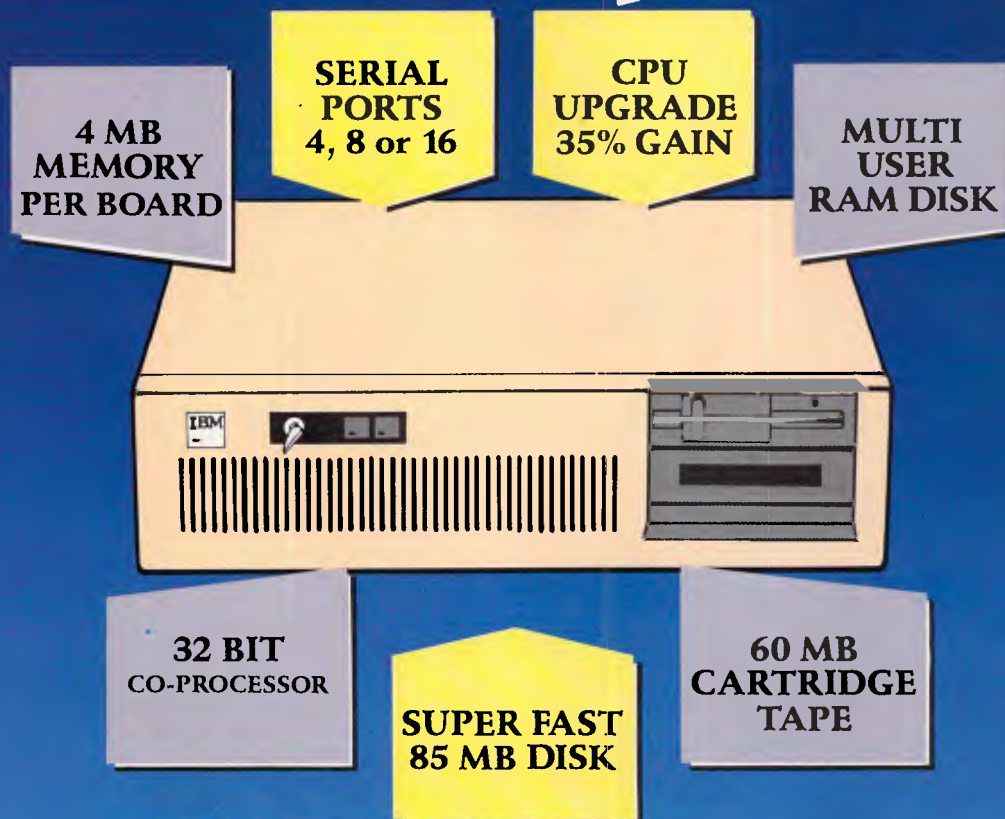
Mention this ad, and we will give you over 20 free programs with your new Logitec Compatible PC. Then you can do spread sheets and word processing right away at no extra cost.

Logitec

Only your pocket will know the difference.

Authorised dealers: NSW Logo Computer Centre (02) 8196811. VIC Robs Computer Centre (03) 791 2900, Benson Computers Pty Ltd (03) 534 0994. Mildura C&G Sovereign (050) 23 6272 SA Computer Program Machines and Service (08) 212 7535. TAS Computercraft (003) 318 133. Other areas (008) 33 4854.

Isn't it time your IBM PC had these options?



Well now it can
with twice IBM's standard warranty period including accidental breakage, and nationwide on-site support.

These days with good documentation software packages do not take very long to learn. And as soon as you become proficient its natural to want your computer to perform faster. That's where CPU+ can help.

Our goal is to provide powerful cost effective computing. We do this by increasing the central processor and disk speeds which are the usual bottlenecks. Imagine saving up to 75% of the time wasted waiting for your computer. That's probably hundreds of hours in a year but that's what our enhancements can do.

And there's more.

We have options that allow you to connect up to 16 users, disk capacities up to 160MB, a cartridge tape drive, extra memory, graphics and video interfaces, and even a 32 bit co-processor for hefty number crunching. All of our options fit into the standard IBM PC cabinet — no add on boxes and cables.

If these features sound as though they can answer your needs then you're most likely a serious computer user. So we have nationwide on-site service — just like the mainframe guys. But we unconditionally warrant our

products for six months including accidental breakage — that's twice the industry standard.

If you would like to see an IBM PC/AT configured with our options and put it through its paces simply call for the address of your nearest participating IBM dealer or Value Added Reseller.

Or call toll free for same day Info mailing.

More info. SYDNEY 319 2223
STD (008) 22 5455

IBM Dealer nearest you
(02) 411 6122

CPU +

CPU plus Pty Ltd

Chatswood Executive Centre
10 Help Street, Chatswood, NSW 2067, Australia
Telephone (02) 411 6122 Telex AA 27220

hardware together with a multi-tasking operating system, it might cost a bit more than Amiga, but it would do all the things that the present generation of Amiga programmers are dreaming about, inspired by the first model.

Commodore certainly has such a machine on the drawing board. It won't be out in 1986, but the fact that it is on the way is a promise that software developed for today's Amiga can look forward to an expanded future, a concept that can encourage programmers more than a little.

Amiga 2 will be out (in the US) in 1986, around September, with 1Mbyte of RAM as standard (2Mbytes please, Commodore!) and various other improvements, with virtual memory a real possibility.

The PAL version will be produced around July, with software developers receiving prototypes in May. It won't be compatible because it has 256 lines, not the 200 lines of the American version. The Amiga knows where it is on each scan line, so the difference is crucial to picture handling.

The price of the Amiga will drop, but it's only guesswork to say by how much, or when.

And it remains the machine which I've been waiting for, even though I've had to trim my dreams a bit to suit.

Guy Kewney

Comdex fairy tales

It's fairy tale time again, with people arguing about just how many visitors attended the big Comdex exhibition in Las Vegas.

The show was back in November, and Newsprint has already carried a short report of instant news, reflecting the general impression that it wasn't a

headline-grabbing show.

Not everyone agreed, however, and one very valuable insight into what had changed was my favourite inside bulletin, the *California Technology Stock Letter*.

'It's fashionable to say Comdex was boring, with nothing new, not enough dealers, and too expensive. We disagree,' it reported.

The CSL puts chapter and verse down on paper. 'What was new was that nothing was new,' said the editors. 'At previous Comdex shows, all the emphasis was on the latest whizz-bang technology: Gavilan's lap-top, Ovation's knock-your-socks-off integrated software, Visicorp's Visi-on.' Ouch! It's all true, and it's all disappeared.

'In contrast,' continues the *Letter* relentlessly, 'this year's Comdex showed a series of practical products that customers could buy. Instead of "new", we got "real" — for example, Windows finally started shipping.'

The *Letter* goes on to spotlight things I frankly wasn't looking for, and should have been. For example, photocopiers.

Why, you laugh, who's interested in photocopiers! Me, when they cost \$US6000 (Xerox) and are also laser printers. And they'll put in facsimile next. And QMS produced a laser printer — slowish, at six pages a minute, but at \$US2000...

The letter helped me catch up with other things I missed on the floor, too: for example, the fact that Hewlett-Packard, Compaq and IBM are thinking of announcing micros based on the 80486 (yes, four, not 80386) next year.

And it's true that I did feel that the show was good value for anyone buying equipment. There were five new hard-disk-on-a-card announcements, three (possibly four) AT-on-a-card plug-ins for PC users, and

any amount of network software.

But the sense of fairy tale persists, and I'm afraid that for once, the CSL's scepticism failed it.

It accuses the 'boring Comdex' prophets of underestimating the number of dealers. I don't think the number was underestimated: quite the opposite.

'Comdex had about 80,000 attendees,' said the CSL report. And it goes on to suggest that if each of the 4000 American computer dealers sent one person, then only one in twenty visitors to exhibition stands would have been a dealer. 'But that would mean, in five days, that your product is exposed to every dealer in the US!' it concluded.

Well, nonsense.

Apart from the arithmetic, there's no basis for any such suggestion. If each dealer sent one person on average, then every dealer was at the show. But that doesn't imply that every delegate visited every booth (at nearly 2000 booths, you get well under 40 seconds per booth, so I should think it pretty unlikely); nor does it prove that every dealer sent one person. And some dealers sent three people. Where does that leave us?

In a conference session on 'Abuse of the distribution channel', Trip Hawkins spoke eloquently about how his company, Electronic Arts, had built up a distribution business, based on the fact that it had excellent authors and that you had to buy from EA to get them.

At the end of the session, there was a question and answer period, which I ducked out of. Shame.

The point is that I met Trip later, in Silicon Valley, and we shared a couple of laughs about the session, which had been pretty boring. 'But the really funny thing was, when the session chairman asked for a show of hands, everybody in the audience turned out to be a

distributor!' said Hawkins. 'There was only one dealer there.'

Dealers were in very short supply. When times are hard, these small-business owners have to stay to mind the shop because they've fired the hired help. Times are hard.

But who says there were 80,000 visitors? Comdex? Well, last year, it said there were 100,000, which was sheer rubbish. There were around 65,000 people last year, and a lot of them spent money on the casino attractions. The manager of the Circus Hotel estimates that conference delegates bring in \$650 worth of gambling money (which, on average, they lose) compared with \$1075 spent by holiday-makers.

I seriously estimate that there were 50,000 or fewer delegates at Comdex Fall 85. And most of them were distributors, corporate buyers, software authors and end-users, whatever they say on the forms they filled in.

I can't resist one final plug for CSL, by the way.

One item in the Comdex report highlights a product sold by Westminster Software in the States, and is, notes the CSL, the second best-selling micro PERT package in the US.

The item actually begins, however, with a loud and clear disclaimer: 'We are investors in and board members of a private company, Westminster Software.'

If other newsletter editors in the States were that straightforward about their stockholdings, their credibility would be very, very much higher.

Guy Kewney

CD-ROM fever

Whatever happened, we all wondered, to Gary Kildall, the man who invented CP/M? The answer, I discovered on a visit to his new company in Monterey, Cali-

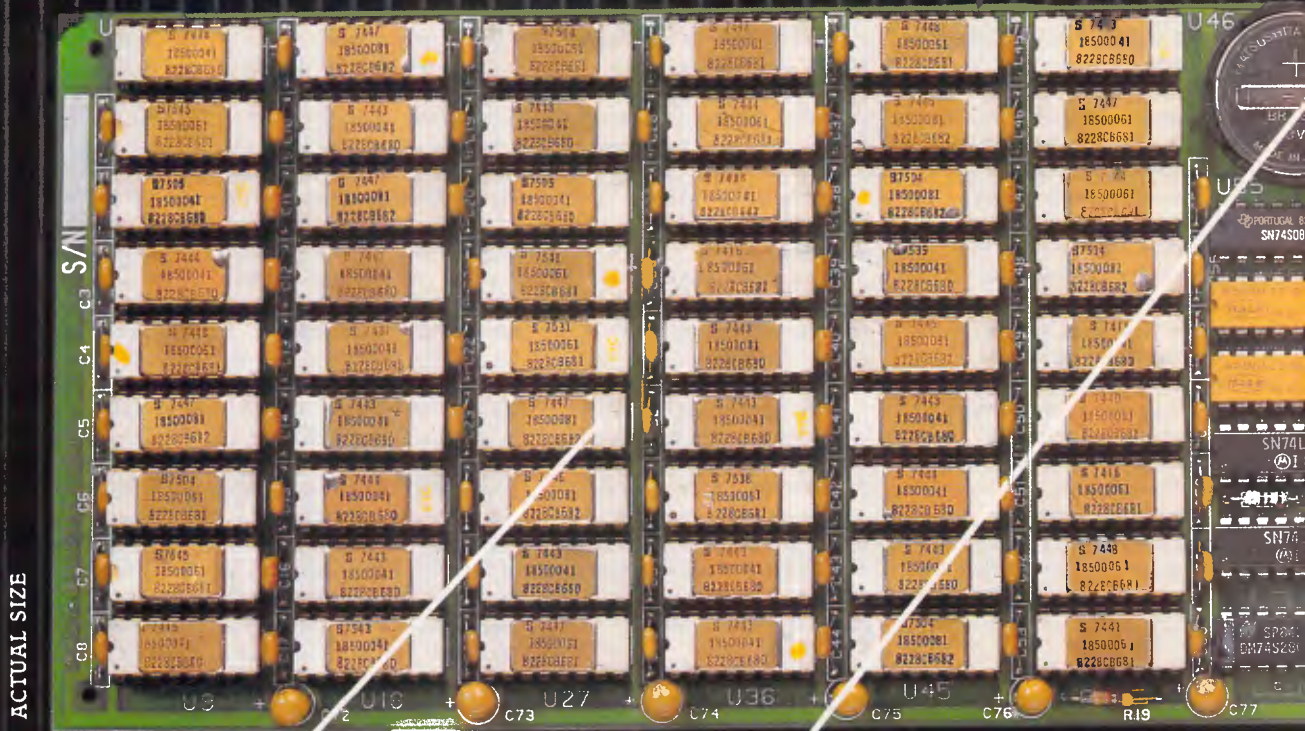
6PAK PLUS™ QUBIE

By **QUBIE**

9/62 Blackshaw Avenue, Mortdale
N.S.W. 2223 Australia
Telephone: (02) 579 3322

4809 Calle Alto, Camarillo
California 93010 U.S.A.

Tempo House, 15 Falcon Road, London
SW11 2PH, United Kingdom.



384K MEMORY EXPANSION

Socketed and expandable to 384K. Your 6PakPlus™ comes standard with 64K memory. 384K on the 6PakPlus™ added to 256K on the PC system board provides for the maximum addressable user memory.

CLOCK/CALENDAR

6PakPlus™ eliminates the need to manually input the date on system start-up. The chronograph is fully compatible with all PC-DOS software routines which utilize clock functions. Battery backup power supply keeps the clock running at all times.

PARALLEL PRINTER PORT

Interface the PC to most printers or other parallel devices. The parallel port can be addressed as LPT1 or LPT2. Internal cable and DB25 connector are all included.

THE MOST POPULAR, MOST RESPECTED, MULTIFUNCTION BOARD IN AUSTRALIA!

6PakPlus™ is a powerful multifunction enhancement for PC or PC-compatible machines. With Qubie's flexible configurations, all the PC's capacity can be utilized. It's totally compatible

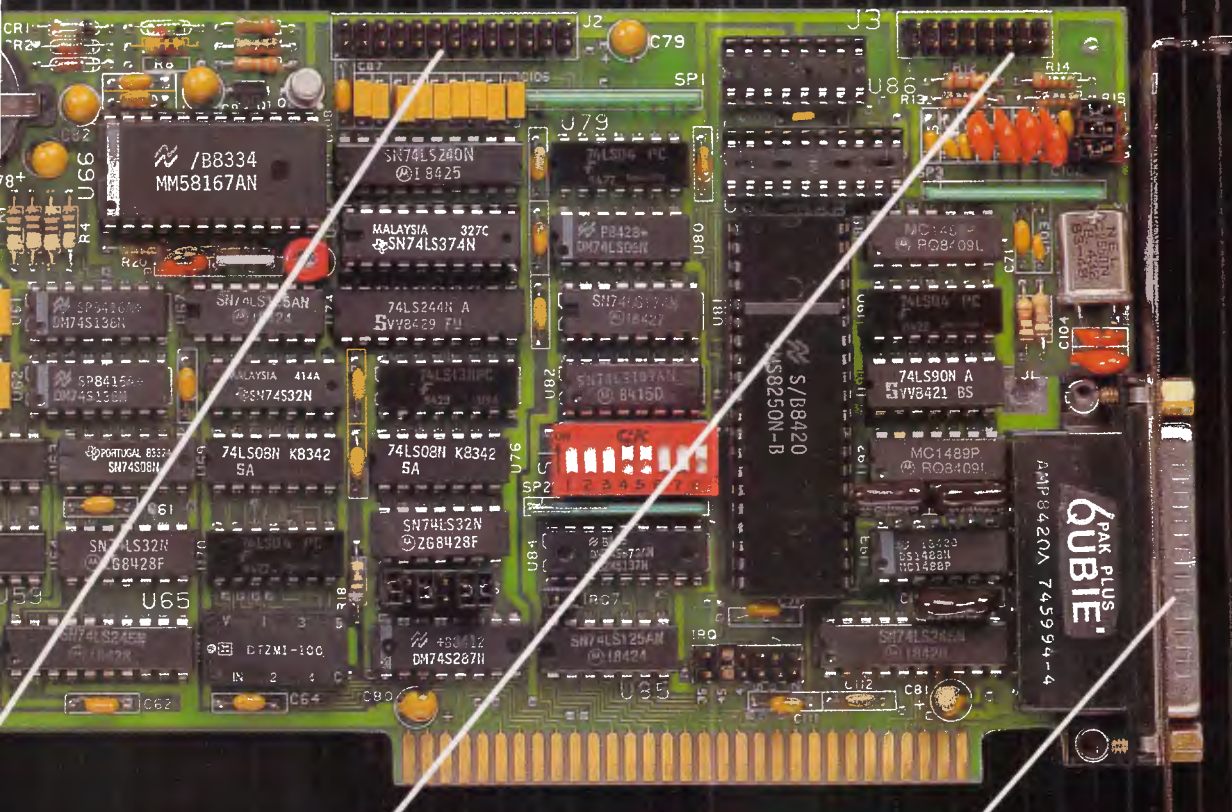
with IBM hardware operating systems and languages. The board can be inserted into any free slot and it even includes a card edge guide for secure mounting.

SOFTWARE INCLUDED

With 6PakPlus™ you receive extensive software at no extra cost. Electronic disk caching and printer buffering are all part of the 6PakPlus™ package.

THE QUBIE' PLUS

Good service starts with local support and local supplies of product.



OPTIONAL GAME PORT

Game adapter port which can be used with all IBM-compatible joysticks or game paddles.

ASYNCHRONOUS COMMUNICATIONS ADAPTER

Serial port can be used to connect the PC to letter quality printers, plotters, modems, or other devices which use an RS-232C interface. Switches allow the port to be configured as COM1 or COM2.

AVAILABLE AT YOUR LOCAL DEALER
CALL FOR THE NEAREST DEALER



Advance the megabyte power of your computer in one easy step.

The new Advance/NEC disk drive unit will do just that. In one simple add-in move.

The new Advance/NEC hard disk comes complete with drive, controller card, cables and all fittings, plus an explicit, step-by-step manual which makes it easy to install and ready-to-run in just minutes. It is available in 10 or 20 megabyte units. No extra power source is required.

The new Advance/NEC half height disk drive is compatible with IBM PC/XT/AT and other IBM compatible machines; portables too. The controller card uses LSI circuitry which allows the disk to run faster than the XT.

We will give full service back-up and a 12 month warranty on all Advance units.

Ask your local dealer about Advance or phone for more information.

ADVANCE PERIPHERALS PTY LTD.

SYDNEY: 21/84 Reserve Rd. Artarmon 2064. P.O. Box 215. Gordon 2072.
Phone: (02) 439 5900. Telex: AA71517 (ADRI B)

MELBOURNE: 87-101 Roden St. West Melbourne 3004.
Phone: (03) 329 2384. Telex: AA30834 (DISPLA)

ADVANCE
AV
Peripherals
EXPANDING COMPUTER POWER

fornia, is that he's got into the CD-ROM game.

His new company, Acti-venture, is computerising compact disks.

His first product, oddly, wasn't a computer-readable disk at all, but a 12in video disk with *Grolier's American Encyclopaedia* on it.

Each video frame was a page of text, indexed in a better-than-rudimentary way, for interactive video disk players. And apparently there are 'only 120,000 of these around in America', to quote Gary, so he made a bit of money there.

People suggested, before I visited him, that the problem he would face was reluctance — on the part of publishers — to let someone else have their text.

Not a bit of it, he responded. 'There's a lot of this sort of information already on online databases, and all we do is take their tapes and sell them. The profit margins are very good, and the number we can sell is good.'

Profit margins good? I'll say! The CD-ROM is actually cheaper, today, than a floppy disk. It doesn't have to be loaded with data by a magnetic recording process, it is just stamped out. It holds 400Mbytes — the Grolier takes 160Mbytes including indexing information. And it sells for nearly \$100.

Gary has his indexing software on the IBM family, under Concurrent DOS (he remains chairman of Digital Research, which sells Concurrent, so that's no surprise) and on the Atari ST, under GEM (DR sells Gem, too), and it looked pretty nearly ready to sell, from the demonstration he gave.

From the States, Cuadra Associates has issued a market research report on online databases (it prints a directory of the services) showing that 197 new databases went online in

the months August-October 1985, bringing the total to 2890 databases, through 442 online services; world wide. Carlos Cuadra, the president, describes the situation as a 'bandwagon' even though the number of casualties remains high, too.

From Frost and Sullivan, more market research shows that the optical disk market will grow at an annual 271 per cent from 1984 to 1990 — a forecast it describes as 'conservative'.

Kildall describes Acti-venture as 'high-risk' and has spent around \$1m equipping his company with computer equipment for transferring text into optical disk format. But he also describes his outlook as 'optimistic'.

I wouldn't like to be in the magnetic disk business, even with 5Mbyte floppies appearing.

We should be told

Version 2.0 of Lotus 1-2-3 had an encryption problem which screwed up the hard disk. Lotus admitted there was a problem, but is the company still selling it?

The winners

Time to announce the lucky winners of two recent APC competitions. The first was in the August issue and required the entrants only to supply name, address etc in a "draw from the hat" contest. Michael Stacey of Telarah in NSW was the first out, and is now the proud owner of an Amstrad 664.

In the second competition, we asked readers to make us roll around the floor belly-laughing. The three who came closest are Les Pobjie, Don Thorpe and J Hutley — Don Thorpe eventually being voted the funniest APC reader. Courtesy of Com-

STOP DON'T PAY OVER \$200 FOR YOUR VIATEL MODEM FIND OUT HOW

VIATEL

EXCLUSIVE AUSTRALIAN DISTRIBUTOR

\$199 **\$139** **\$175**

DISCOUNT DIRECT CONNECT MODEMS, REALISTICALLY PRICED SO NOW EVERYONE CAN AFFORD TO ENJOY THE CONVENIENCE OF THE VIATEL REVOLUTION.

Our modems are fully VIATEL compatible. BONZA VALUE. Expect to pay up to \$800 from other sources for units similar to these beauties. They are V.21/V.23 modems, this means that you can access VIATEL Videotex at 1200/75 Baud rate and also Viatel bulletin boards and other data bases at 300/300 Baud rate. Your computer is not a two-dimensional toy, but a powerful tool, add a modem and realise far greater powers. These 3 models simply plug into your computer and then into your phone socket. All you do then is join Viatel and a whole NEW realm of POWER and CONVENIENCE is at your fingertips so JOIN THE VIATEL REVOLUTION. ORDER YOUR MODEM TODAY. Contact your local Telecom office for your FREE Viatel info-kit and ask about the Viatel Directory.

JOIN OUR HOME-SHOP DISCOUNT CLUB AND QUALIFY FOR THE SPECIAL LOW MEMBER'S PRICE

MODEM MODEL	BRAND & MODELS SUITED FOR	NON-MEMBER PRICES	HOME-SHOP DISCOUNT CLUB MEMBER'S PRICE ONLY
V.23 CT	COMMODORE C-64 & C-128	\$232. Ex. Tax \$245	\$126. Ex. Tax. \$139
V.23 AT	APPLE II, II+, IIe & COMPATIBLES	\$233. Ex. Tax \$250	\$158. Ex. Tax \$175
V.23 BT	IBM PC, XT, AT & COMPATIBLES	\$272. Ex. Tax \$290	\$181. Ex. Tax \$199

ALL PRICES QUOTED INCLUDE MODEM, SOFTWARE, S/TAX & FREIGHT

- * FULL MODEM PACKAGE, NO EXTRAS TO BUY
- * CONVENIENCE AND POWER AT YOUR FINGERTIPS
- * 14 DAY MONEY BACK IF NOT SATISFIED (IN ORIGINAL CONDITION)
- * 6 MONTHS WARRANTY (RETURN TO STORE)
- * FREE COMMUNICATION SOFTWARE
- * V.21 / V.23 (VIATEL) COMPATIBLE (1200/75, 300/300 BAUD RATES)
- * ACCESS TO ALL VIATEL BULLETIN BOARDS
- * IDEAL FOR HOME, BUSINESS, EDUCATION
- * PRIVATE EDUCATION STUDIES ON VIATEL
- * ACCESS TO HUNDREDS OF VIDEOTEX SERVICES ON VIATEL
- * REALISTIC PRICES, HIGH QUALITY UNITS
- * NO HIDDEN COSTS, YOU PAY ONLY ONE PRICE
- * DIRECT TO YOU PRICES SO YOUR SAVINGS ARE BIG
- * NO MORE PARKING FINES, TRAFFIC JAMS, WEAR & TEAR ON YOUR CAR, DO YOUR BANKING, SHOPPING, STUDIES, BUY STOCKS & BONDS, BUY THEATRE OR AIRLINE TICKETS, SEND MESSAGES TO A TELEX MACHINE OR ANOTHER COMPUTER IN ANOTHER STATE, PLAY ADVENTURE GAMES WITH A MATE IN ANOTHER STATE, HAVE A GARAGE SALE, DOWN LOAD SOFTWARE, THE LIMITS AND SERVICES ON VIATEL ARE ENDLESS, AND ALL DONE FROM YOUR HOME, BUSINESS OR SCHOOL VIA YOUR MICRO COMPUTER
- * EASY TO USE, LIKE USING A PUSH BUTTON PHONE
- * EASY TO INSTALL, JUST PLUG IN
- * BUILT-IN LINE ISOLATION UNIT TO SAFEGUARD TELECOM SYSTEM
- * GREAT, FRIENDLY AFTERSALES SERVICE & HELP
- * WE HAVE WORKED HARD TO LOWER THE SALES TAX YOU PAY
- * WE'VE BEEN ESTABLISHED SINCE 1981
- * IF YOU LIKE, WE HAVE OVER 30 MODEMS TO CHOOSE FROM
- * JOIN OUR HOME-SHOP DISCOUNT CLUB FOR A LOW \$5.00 AND ENJOY HUGE SAVINGS — up to 60% more saving on other items WITH ALL THESE FEATURES HOW CAN YOU LOSE.

IF YOUR BUYING YOUR COMPUTER NEEDS FROM SOMEONE ELSE (DESPITE THEIR CLAIMS OR BEING THE LARGEST DR BEST IN THE NATION) THEN YOUR PROBABLY PAYING FAR TOO MUCH GIVE US A GO, WE'LL DO IT RIGHT FOR YOU.

P.S. Our deepest apologies for the long delays to the many, many hundreds of inquirers for our 64/80E (Apple IIe compatible) computer, we had a few technical bugs to iron out. Both software and hardware have been totally redesigned and USA registration has been applied for. If we proceed with it, it will be a detachable unit with dual CPU, 2 d/drives, colour card, 128k, 80 column and monitor for under \$1400.00 for non-members and under \$1000.00 for HOME-SHOP member, we'll keep you posted on it.

N.B. Due to Aussie \$ slump against Japan yen, prices subject to change with new shipments, AVOID DISAPPOINTMENT AND ORDER NOW. If you do not wish to damage your magazine, use photocopy or PRINT/TYPED your order on a blank sheet of paper (please PRINT as below).

THE ABOVE TRADEMARKS BELONG TO REGISTERED OWNERS

ORDER NOW AND SAVE



TO: **VALRIAN ENT. P/L DE221-6**
P.O. Box 82, BROADMEADOW
NSW. 2284, AUSTRALIA

YES I'm impressed, please RUSH me my VIATEL modem so that I can start enjoying the benefits soon. I DO/DON'T wish to join your HOME-SHOP DISCOUNT CLUB, so that I HAVE/HAVE NOT enclosed an extra \$5.00 for my life membership fee (covers paper work non-refundable). As a member I am entitled to special member prices on all items I purchase from you, this is effective immediately so please charge me ONLY the special MEMBER PRICE for my modem order. I have enclosed cheque, money order or please charge my credit card for the amount of \$ this covers all costs for Qty. units of (V.23CT/Commodore) (V.23AT/Apple) (V.23BT/IBM) modem(s) @ \$ each.

N.B. NO PURCHASES NEEDED TO JOIN OUR HOME-SHOP DISCOUNT CLUB Please cross out answers above & if using credit card tick below.

B/CARD M/CARD Visa Am/Express Din/Club

PLEASE ALLOW UP TO 28 DAYS FOR DELIVERY.

I have enclosed full payment, please Rush My order to:

NAME:

ADDRESS:

STATE: P/CODE: COUNTRY:

TO AVOID DELAYS Please re-check above and PRINT clearly.

32 Broadmeadow Rd. Broadmeadow. TEL: (049) 69 5341. TLX: 28328

Peace of mind in three sizes.



Now Fuji brings you
excellence in floppy disks.

There's nothing more frustrating than having a disk go down when it is filled with valuable data. That was our understanding when we first started designing our floppy disks.

We decided to do it right!

The result is a range of products that is so reliable, it carries a lifetime warranty.

The excellence that is relied upon with our photographic products is now available in our range of highest quality disks. Ask for them by name.



SELECTED SUPPLIERS

N.S.W. SYDNEY: Contact Computer Supplies 419 4908 — A B Office Electronics 949 7195 — C.A.E. Electronics 621 4242 — Calmar Distributors 698 1999 — The Computer Shop 517 2999 — Intelligence 699 3877 — Lamron 808 3666 — Logical Solutions 212 6655 — Manly Stationery Supplies 938 2522 — Pre-Pack Electronics 569 9797 — R.I.O. Distributing 399 9900 — Thinking Systems 560 0666 — Transcript 764 2177 — The Computer Stationery Co 635 1339 — DUBBO: Orana Cash Registers 82 5833 — WOLLONGONG: Altech Electronics 84 3059 — Business & Leisure 29 9744 — WAGGA: Verlynn Computer Services 21 6522 — VIC. MELBOURNE: Goodman Cannington 429 8011 — Output Media 544 4400 — Copy Source 429 9355 — Ray Cross Electronics 762 8566 — BALLARAT: Ballarat Image Supplies 35 7298 — GEELONG: Systems Stationery & Computing 22 2844 — HAMILTON: Sovereign Office Machines 72 2333 — WARRNAMBOOL: C.J. Computer Systems 62 8178 — QLD. BRISBANE: The Byte Shop 371 0711 — C.W. Electronics 397 0888 — Computer Paper Supplies 369 5277 — Design Offices Co-op 831 4977 — CAIRNS: Cairns Stationery Supplies 51 2277 — MT. ISA: Barkly Computer 43 2929 — SOUTHPORT: Stateside Gold Coast 32 8988 — S.A. ADELAIDE: Boss Business Products 233 2224 — Perce Burton Business Equipment 212 2611 — MT. GAMBIER: Southeast Business Machines 25 8900 — W.A. PERTH: Jays Business Equipment 381 8700 — Regional Computers 328 9062 — BOULDER: Computers West 21 6961 — KARRATHA: Dave's Oscitronic 854 836 — A.C.T. BELCONNEN: Actcom Computer 51 4307 — TAS. HOBART: Southern Star Industries 72 9530 — LAUNCESTON: Computer Craft 31 8133.

Trade Enquiries **Fujimex** a Division of **HANIMEX** (02) 938 0241

HMFD 1225

How to buy a personal computer for just \$5.

At PC86 – The Sixth Australian Personal Computer Show – you'll have a wealth of information at your fingertips. You'll be able to see and compare the very latest micro-computers, hardware, software, peripherals, publications and services.

You'll gain invaluable hands-on experience. And you'll discover which computer is exactly right for you.

All in the one place, at the one time. PC86. 12-15 March. Centrepoint, Sydney. The best way to get your hands on a computer – for just \$5.

Open: Wednesday-Friday 10am-7pm, Saturday 10am-5pm.

For further information phone Australian Exhibition Services Pty Ltd on (03) 2674500.

THE SIXTH AUSTRALIAN
P	E	R	S	O	N	A	L
C	O	M	P	U	T	E	R
S	H	O	W				

CENTREPOINT

PC
86

SYDNEY 12-15 MARCH 1986



NEW YEAR SALE

IBM and APPLE enhancement products. Prices remain while stocks last.

MULTIFUNCTION BOARDS

4064 — 64K 2 Serial Ports	\$150
4256 — 256K 2 Serial Ports	\$175
5064 — 64K 1 Serial 1 Parallel	\$150
5256 — 256K 2 Serial Ports	\$195
6556 — 256K 1 Serial Ports	\$250
6512 — 512K 1 Serial Ports	\$350
5384 — 384K 1 Serial 1 Parallel	\$395

MULTIFUNCTION BOARDS WITH RGB COLOUR ADAPTOR

GB256 — 256K 1 Serial 1 Parallel RGB	\$695
GB384 — 384K 1 Serial 1 Parallel RGB	\$745

SHORT SLOT MEMORY

XP256 — 256K Memory Expansion	\$395
XP384 — 384K Memory Expansion	\$425

QUADSPRINT ACCELERATOR

Halves your Processing Time	\$795
-----------------------------	-------

QUADLINK —

Allows IBM PC to run Apple Software	\$795
-------------------------------------	-------

HARD DISK SYSTEMS

QD7000 — 5MB Removable Cartridge	\$995
QD7012 — 10MB Full Height	\$895
QD7020 — 15MB Full Height	\$925
QD7027 — 20MB Full Height	\$995
QD7072 — 60MB Full Height	\$2795

COLOUR BOARDS

Quadcolor I	\$150
Quadcolor II 640 x 200 16 Colours	\$199

MONITORS - PRINCETON GRAPHICS

HX-12 Colour	\$495
MAX-12 Monochrome	\$250

PRINT BUFFERS

MP 16 — 16K Parallel to Parallel	\$395
MP64 — 64K Parallel to Parallel	\$334
MP256 — 256K Parallel to Parallel	\$441
MP512 — 512K Parallel to Parallel	\$584
MSS16 — 16K Serial to Serial	\$334
MSS64 — 64K Serial to Serial	\$379
MPS16 — 16K Parallel to Serial	\$175
MPS64 — 64K Parallel to Serial	\$195
MSP16 — 16K Serial to Parallel	\$334
MSP64 — 64K Serial to Parallel	\$379

COLOUR INK JET GRAPHICS PRINTERS

\$695 \$139

LASER JET PRINTERS

\$ CALL

APPLE ENHANCEMENTS

ERAM80 80 Column Card Plus 64K Ram	\$99
APIC Apple Parallel Interface	\$70
APIC/G Apple Parallel Graphic Interface	\$80

All prices are C.O.D. and exclude sales tax.

Intelligent Systems

17 Natalia Avenue, Huntingdale, Victoria, 3167.
Ph: (03) 543 7988. Telex: 134872

modore, he has received a 128 for his troubles. Runners up in both competitions will receive subscriptions/extensions to this magazine.

Tutorials

A number of tutorial packages have been announced for the beginning of the school year. For the Micro-Bee is Teacher's Toolkits from Focus Educations Software. It is written by a senior maths master at St Peters College in Adelaide and covers graphing functions, probability and astronomy (including reference to Halley's Comet). Call (09) 325 7644 for more information.

An Australian authoring system, appropriately named Author, has been released for IBM PCs and compatibles. An authoring program allows teachers to develop and deliver interactive videodisc sequences, speech synthesis, music and colour graphics. A demonstration package, including manuals, is available for \$50. Call (03) 817 3214.

On a less serious note, Commodore has produced a quiz program. It has three topic areas available: 'Words', People Places and

Things' and 'You and Your World'. Two teams are required (plus a Tony Barber-type person to mediate) and take turns answering randomly ordered questions. In addition, users can add subjects to the game themselves or purchase additional data disks for \$21.95 each. Game Show retails for \$49.95.

Not a new product, but a new distributor: Arthur Young's 'self teaching interactive video and computer based training course' is now handled by Micro Management Services. Subjects dealt with include Lotus 1-2-3, Multiplan, Multimate, WordStar and dBase III. Rental or purchase of the courses is available by calling (02) 452 3779.

From Intouch Computing comes a micro-based tutorial for IBM PCs and compatibles. It takes the pupil through the basics of computing, then continues into a high level language (Basic) and onto assembly language. By using a 'concurrent window' the Complete PC tutorial can tutor and, at the same time allow the normal operating system and applications software to run normally. Call (09) 339 4431 for the location of your nearest dealer.

And lastly, the Metropolitan Business College hopes it has come up with something to give those computer-shy executives, RSI sufferers and the handicapped a chance to become acquainted with the personal computer. It is using voice recognition units to obviate the necessity of using keyboards. Telephone (02) 232 7666 for more details.

Caught with your pants down

When your micro's insurance runs out and you forget to renew it, your micro will breakdown. Imagineering has woken up to this fact of life and is now offering a fixed price non-warranty repair service. The company has prepared a list of products covered by the non-warranty service, which will be carried out by its technical department based in Sydney. Other products "will be repaired subject to quotation approval or on a time-and-material basis" said Tony Iannuzzelli, Imagineering's technical manager. Imagineering is on (02) 662 4499.

More JX support

IBM is giving its JX micro a further push with the release of five software packages. Direct Helper (designed to help children and adults overcome learning disabilities); Attache Business Pack (an integrated accounting package for small to medium sized businesses), Typequick (recognised as one of the best keyboard training packages around); Saltbush Series (a farm management system); and Wordworm (a spelling tutorial). IBM doesn't pre-announce — so these packages are now on sale from IBM PC dealers.

Briefs

Appointment Diary and Smart Alarms are a couple of desk accessories (so they can be used from within any application) for the Macintosh. Together they sell for \$80 although each can be purchased separately. The distributor, Jam Software, is on (02) 799 1696 . . . Condense a life-time of business headaches into a fun-filled evening with the Strategic Management Game. It's a business

A Fat Mac without a Fat Price

Performance

With today's Macintosh software, having at least 512K of memory is a must. But it doesn't have to be a financial problem.

We offer a complete 512K memory upgrade for \$339.95.

More Versatility

Be able to run programs like Jazz, Helix, Excel, and Omnis 3.

No Power supply Problems

Your power supply will easily handle the extra memory.

Reliability

512K upgrade boards are professionally manufactured using modern soldering techniques. Every unit is tested during all steps of production.

Product Support

All RAM chips are "Burnt in" and every unit "Hot run tested." A 90 day warranty is supplied on parts and labour.

Chips Used

We only use genuine Hitachi HM50256-15 chips.

The Last 512K Upgrade

Here at the Mac Clinic, we believe you need not look any further than us for your 512K upgrade. Sensibly priced, quality components, and warranty make it the obvious choice.

Yes, I want one

Simply freight your Macintosh, or mother board to us or call in any week night or weekend. We will freight the unit back to you, usually the next day.

Installation

Can be arranged in your home or office.



Mac Clinic

17 Calla Grove Pendle Hill 2145. N.S.W. (02) 631 5657. A division of Stuart Management Services.



When you're up to your neck in crocodiles, it's too easy to forget that your goal was to drain the swamp. Modern Business is often like that. We get so involved with today's deadlines, we never have a chance to stand back and think.

SuperProject

SuperProject from Sorcim/IUS can help you plan...anything. You just sit at a terminal and describe all the things to be done, by whom, for how long, and in what order.

Each resource has its own calendar and you can see the project in detail or in overview.

SuperProject tells you the cost, the finish date and who's over-committed. All the critical activities are highlighted in red.

SuperCalc3

SuperCalc³ Release 2 from Sorcim/IUS is a classic spreadsheet with some key differences. Precious memory is only used by cells holding significant data. Your model can be as large as 9999 rows by 127 columns. There is no need to change disks to graph results. It's up to 10 times faster.

You can move across whole pages with a single keystroke. And print your results sideways.

AUSTRALIA'S LEADING SOFTWARE DISTRIBUTOR

arcompacific
BRISBANE MELBOURNE SYDNEY HAMILTON (NZ)



BUY THESE PRODUCTS FROM ANY REPUTABLE COMPUTER DEALER

\$5 SPECIAL OFFER ON DEMO DISKS

These are complete packages - but with restrictions on storing and printing. SuperCalc³ and SuperProject include a demonstration. You'll need an IBM PC, XT, AT or close compatible with 256K memory. Call (07) 52 9522, (02) 957 4678, (03) 51 9446.

simulation training package which is supposed to test the decision making ability of the players. The game simulates (how realistically, we cannot say, having not the time for the fun-filled evening) all the dimensions of a real business with capital expansion, marketing wars, new product development, product enhancement and obsolescence and geographic expansion. As you'd expect it's very popular in

America. Demonstration packs are available for \$10 by calling (02) 233 8666 . . . Creative Computing is marketing an Australian accounts suite designed for IBM's PC/AT and compatibles. It runs under Xenix and is written in C. Unlike some other products it is not a rehashed UK or US product, but totally Australian" says Bernie Hogan of Creative. The software can support the

multi-terminal capability of the PC/AT. Tel. (07) 369 5422 . . . Two single board 68000-family computers are being distributed by Paris Radio Electronics. A large range of languages is available; call (02) 344 9111 for more details . . . Business Computers International in Richmond, Melbourne is marketing a locally developed quoting and estimating package. According to BCI, one of the main advantages of the package is the ease with which customisation of the estimating requirements can be achieved for specific industries. Tel. (03) 429 2042 . . . Sharp PC users can now easily encrypt data with a recently announced Australian device called the Compucrypt. It was specifically designed for the protection of data being transmitted from and to Sharp's portable PC-5000 but will soon be available for the MZ5600 and the PC-7000; details on (02) 728 9111 . . . To demonstrate the IBM PC/Hercules card compatibility of its graphics

card, Sourceware is bundling Flight Simulator in with 'Preview!'. The AST-developed Preview! replaces the IBM monochrome display/printer adaptor and provides two graphics pages each of 720 by 348 pixels, a parallel port, AST's SuperPak utility disk, a RAM disk, and SuperSpool. Preview! uses one full size expansion slot. Tel (02) 411 5711 . . . IBM has produced a version of a mainframe relational database for its range of PCs. The relational language SQL, IBM's fourth generation language in SQL/DS and DB2 on the mainframe is now available under PC-DOS . . . Porchester Computers is the new distributor for US company Orchid Technology. Orchid is responsible for the PC-Net networking system for the IBM PC and a range of add-ons including a go-faster board for the PC and a multi-function board with 2Mbytes of RAM conforming to the Lotus/Intel memory expansion specification . . .

END



This is a printer from NEC. It costs \$695. The preceding two sentences do not conflict, as a less than generous reader might be tempted to suggest. The ELF, as it is known, is based on the hitherto previously expensive NEC thimble printing element, and being a member of the Spinwriter family, the ELF can use any of the 190 available thimbles, each with 128 characters. Both NEC and Diablo command codes can be used, and RS232 and Centronics ports are standard.

Natwick Management provided us with this picture, so you'll probably find the ELF in stock there. Call (02) 428 1666.



'I hope you realise what a terrible disappointment you are to your father.'

PHOTOSSET COMPUTER SERVICE



NEC
AUTHORISED
DEALER

- APC III Personal Computers
- PC 8401 Lap Portable Computers
- Printers and supplies
- Business Software

264 7077

195 Elizabeth Street, Sydney (near Park Street)

Right in the heart of Sydney





WHAT DID IT TAKE TO GET RORY COLLINS TO DO THIS AD FOR US?

"I don't have time to read very much, so the only way to do it is to lock into one or two publications.

"The principal reason I read Computing Australia is to find out about people and products. They hit the key issues right on the head. And we must have that in the industry."

Rory Collins, D.P. Manager at Coopers & Lybrand, didn't need any

coaxing to say this. Just the facts.

And the fact is, every week he and 21,000 other decision-makers receive Computing Australia through the mail.

All it takes to get your message through to them is a phone call to us.

Call Mark Reiss (display advertising) or Christine Longman (recruitment) in Sydney (02) 264 1266 or Alistair Gordon in Melbourne (03) 531 8411.

Published by ACP-VNU Computer Publications.



The first computer newspaper with byte.

MAC

S P O K E N H E R E

MacSales



We stock the lot! All Mac models 512, Plus & XL. External drives and hard disks. Memory upgrades available to 2MB. Printers are our Specialty: Imagewriter I & II, Epson, Brother and the exciting LASERWRITER in stock. Software for Home, Entertainment, Graphic Arts, Publishing and all Business levels carried.

MacService



Our Apple Authorised Service Centre is fully equipped to maintain your Mac and all its peripheral equipment. Warranty, Repairs and Installations carried out by Apple-trained technicians. Memory upgrades and Hard disk fittings by qualified staff. For the best Service Plan available, choose genuine "APPLECARE" facilities — ask for details!

MacTraining



Seahorse has the LARGEST Macintosh training facility in Southern Sydney. Regular 'hands on' sessions are conducted for new and potential users. Courses in the use of Mac in business situations are a regular feature. Instruction in specific software packages such as Multiplan, Jazz, Excel will begin early in 1986. Ring us for session dates and times.

We are the fastest growing Apple Dealer in NSW due to total customer support. Call into either of our stores, check the product range — and especially the prices — or just drop in for a coffee and "talk some Mac".



SEAHORSE COMPUTERS

3/23 Argyle St, Camden. Phone: (046) 66 7551
83 Dumaresq St, Campbelltown. Phone: (046) 28 3311
Station Street Arcade, Blaxland. Phone: (047) 39 6244

-CHECKOUT-

Macintosh Plus

The Macintosh Plus is Apple's gesture of acceptance of the criticisms of the original Mac — primarily, insufficient memory and disk space, and a slow disk drive. How has the company rectified these shortcomings? Nick Walker tests the new Mac's capabilities.

It may not have sold in anything like the same numbers as the IBM PC, but few would disagree that the Apple Macintosh (and its predecessor the Apple Lisa) is one of the most influential machines in the history of microcomputers. After three years of setting the pace, Apple now has competition in the form of Com-

modore with the Amiga, Atari with the ST, and numerous other micros offering windows, mice, icons, and so on. Even the IBM PC makes a passable attempt when running GEM or Windows.

With the advent of this competition, speculation has grown as to how Apple will respond. Certain facts are known.

The Macintosh was designed to be capable of driving a colour display; perhaps that will be the main feature of the next Mac. John Sculley, the president of Apple US, hinted at more industry compatibility, leading to all kinds of disturbing rumours about Apple falling into line with IBM. Will criticisms of the original Macintosh continue — not enough memory, not enough disk space, disk drive too slow, non-standard I/O ports?

After the launch of the Fat Mac with 512k of RAM, there was a quiet period when very little in the way of new hardware was announced by Apple. And then at the end of 1985 came the LaserWriter, the HD-20 hard disk, the ImageWriter II, and now a new Mac to drive them all — the Macintosh Plus.

Hardware

Externally there is little to distinguish the Macintosh Plus from its predecessor; during the course of this review, the machine sat openly in my office and no-one distinguished it from a normal Mac. The most obvious external difference is the keyboard, which has grown by four inches to incorporate a numeric keypad. The system case is almost identical to that of the original Macintosh, which is understandable — having tooled up an automated production line, you don't make gross design changes without good reason. A careful examination of the system case will reveal 'Macintosh Plus' next to the Apple badge on the front, a similar change to the information on the back, and, most important of all, a collection of new and different I/O ports running across the rear.

Lovers of the original clunking, hollow-feeling keyboard need not be too alarmed as the new keyboard has exactly



CHECKOUT

the same feel. After weeks with an IBM keyboard it does feel a little strange, although I'm loath to condemn it as worse — it's just different. To the right there is now a numeric keypad which consists of the digits 0-9, the usual +, -, * and / arithmetic operators, and an Enter key. This is a direct response to the demands of existing Mac users, especially since the advent of the Jazz and Excel spreadsheets.

The remaining alphanumeric keys have not gone unchanged. Whereas all the control keys on the original Mac were depicted graphically, they are now in the more traditional written form: Backspace, Shift, Caps Lock, Tab, Command, Option, Return and Control are now written on the keys. As an occasional Mac user I find this approach much clearer — thinking of meaningful symbols for Option, Command and Control proved a little too much, even for icon-orientated Apple. To the bottom-right of the keyboard there are now four cursor control keys: Left, Right and Down run along the bottom row of the keyboard in that order, with the Up key positioned above the Down. I can't understand why manufacturers position cursor keys in anything other than a diamond configuration. Perhaps in the case of the Mac Plus it's to convince you of the usefulness of the mouse, but nevertheless it proved infuriating to use at any speed.

Overall the keyboard is a considerable improvement, although it's a far more conservative layout than the original Mac; it now doesn't seem too outlandish even for hardened IBM users. Appeal for IBM users might also explain the peculiar cursor key arrangement which is the same as that found on most IBM terminals.

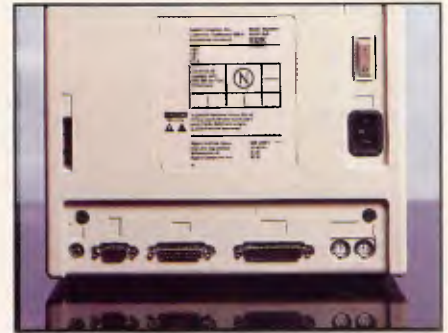
Apart from the keyboard, the major external difference is the I/O ports running along the rear of the machine. From left to right there are now mouse and serial ports, both of the original non-

standard Apple configuration, a high-speed peripheral port, and two mini DIN sockets for modem and printer. This ends the speculation that the new Mac might have slots for expansion cards: Apple claims that with this collection of I/O ports, the Mac Plus now has all the expansion potential it needs. It's probably right.

The high-speed peripheral port is configured to the SCSI (Small Computer System Interface) standard. Over the last year I've come across numerous industry standards that I've never heard of, criticised them for being obscure and have then been proved wrong. This time I'm not being caught out. After a number of phone calls I've determined that SCSI is a true industry standard with its roots in minicomputer architecture; a large number of peripherals is already available for it. It is particularly suitable for storage devices such as hard disks and tape back-ups, but it can also support other peripherals such as scanners and digitisers. SCSI peripherals can be daisy-chained up to a predefined limit — on the Macintosh Plus this limit is seven.

One of the most prevalent criticisms of the Macintosh was that there was no easy way to hang a hard disk off it. The most popular solutions used either the serial or printer ports, which worked but severely limited the speed of transfer. The best solution is a product called Hyperdrive which is mounted internally, but it isn't cheap and involves considerable internal modification. By using this SCSI port, the external hard disk can now achieve the same speed as the Hyperdrive, which is five to six times faster than previous hard disks.

This SCSI port creates a problem for Apple, which has just introduced its own hard disk, the HD-20, for the Macintosh, operating off the serial port. If the company were to change it to operate at the higher speed by using the SCSI port it would effectively lock out the existing



There's adequate expansion potential

user base of half a million. A spokesman for Apple said that the HD-20 will not be changed, but I suspect that a HD-20 with both ports may be forthcoming. Apple will have to be quick bringing this out, as it is now easy for third-party manufacturers to produce hard disks for the Mac Plus.

The printer and modem ports are of the S5/8 standard, an increasingly implemented and upcoming standard. The sockets are of the mini-DIN8 type, and as such are compatible with the newest Apple peripherals such as the ImageWriter II and the Apple Personal Modem. This standard is the one that will be used by Apple for future peripherals.

Internally things have changed considerably, in direct response to what Apple users said they wanted from the next Mac. Nicest of all, the Mac Plus has 1 Mbyte of RAM as standard, made up of 256k chips. Furthermore, by the time you read this Apple should be supplying 1 Mbyte RAM chips, allowing you to expand the Mac Plus to 4 Mbytes without changing the system board. At last, the Macintosh has the memory it needs to obtain the most from its WIMPs (windows, icons, mice and pull-down menus). ROM has also increased, with the two former 32k chips (Laurel and Hardy) being replaced by one big 128k ROM (Mr T).

The other big plus on the Macintosh Plus is the internal disk drive which now works with double-sided disks, giving 800k of disk space — equivalent to 160 pages of A4 text. The double-sided disk also operates twice as fast as the single-sided drive, which considerably speeds up program loading and document access times. In practice, load time is approximately 60 per cent of the load time on the old 400k disk. The new drive will read 400k disks to maintain compatibility with existing software; additionally it will give the option of formatting a double-sided disk as single-sided, which can then be used on both internal and external Macintosh drives.

An external 800k drive will also be



The keyboard is a considerable, if conservative, improvement on the original

available from Apple which will work with both the Macintosh Plus and previous 128k/512k machines.

By now I should imagine that all current Macintosh owners are getting hot under the collar wondering what hope they have of upgrading to a Mac Plus specification. To save you any more worry, I can tell you that Apple has produced an excellent three-stage upgrade culminating in a full-blown Macintosh Plus. The three upgrades are: the Macintosh Plus logic board, 1Mbyte of RAM, and all the new I/O ports incorporated into a new rear case; the Macintosh Plus disk drive kit to turn the internal drive into 800k double-sided, including the new ROMs and system disk; and the Macintosh Plus keyboard. All except the keyboard require dealer installation. You choose whichever one you want depending on your needs, although a disk drive is recommended, especially for Mac 128k owners when purchasing the logic board kit.

Software

There are a number of major changes as far as the system software is concerned. Firstly, the system now formats all disks greater than 400k to use the true hierarchical disk filing system as introduced with the Apple hard disk. This was reviewed in depth in the December 1985 issue of *APC*, so I'll just outline it in brief here.

The original Macintosh used to look through the entire system to find a file, whether it be an application, document or whatever. This was fine with a 400k disk where you weren't likely to have more than a few files on a single disk. However, with a hard disk which can store hundreds of files, this system proved intolerably slow. The hierarchical file system gets round this by allowing you to define any number of directories on a single disk and then linking these directories together in an inverted tree structure. Initially the search for file is done within a single directory which considerably speeds up access times; on the Macintosh, if the file isn't found, a full tree search is then performed until it is found.

Another visible change to the original Macintosh system software is the control panel, the desk accessory that allows you to configure certain system options. Like the keyboard, all the incomprehensible icons have been removed from the control panel and replaced with the text. Numerous icons that I really didn't understand on the original control panel have now been made clear to me. The new control panel is noticeably larger than the original, and this increase in size

is not all due to turning icons into text — a number of new features have been introduced. The old control panel allowed you to configure desk-top design, speaker volume, date and time, the speed at which a double click would register on the mouse, key repeat rate, key sensitivity and the rate at which a selected item from the pull-down menu flashes. All these features have been transferred to the new control panel and the following features have been added — a RAM cache and an Appletalk connection option.

The most interesting of these two extra features is the RAM cache. This sections off an area of memory to be used to store recently-accessed areas of the disk, therefore certain disk-intensive operations become a great deal faster. The RAM cache on the Macintosh can be any size between 32k and 768k, and can be switched on or off. The only operation that revealed any discernible difference was movement through a relatively large spreadsheet using Excel. Nevertheless I am a big fan of cache, having used it in program development and seen big increases in the speed of the compile-link-run cycle. A RAM cache, however, will have no effect on the initial loading of anything.

As far as the Macintosh desk-top is concerned, little has changed. It is interesting to note, however, that after Apple had threatened Digital Research with legal action over GEM, one of the features of GEM is now to be found on the Mac Plus desk-top. In the top right-hand corner of a desk-top window there is a small square which allows you to expand the window to full-screen size by positioning the pointer over it and clicking the mouse button. A second click of the mouse pointer will revert the window

to its original size.

The only other visual differences in the system software are that the opening title box now has an extra black band round its perimeter, and the 'About the Finder' option on the desk accessory menu now proclaims 1024k. But as far as the Macintosh programmer is concerned, the Macintosh Plus offers a host of further facilities. Unfortunately there is insufficient space to go into detail here, so I'll just choose selected goodies and reassure you that there are many more. Of interest to both programmers and users is the fact that the Finder is held entirely in RAM, making all the desk-top operations pleasantly fast.

With the new ROM, Apple has tried to achieve three things: an increase in performance; correction of some outstanding bugs; and, most importantly, to maintain compatibility with existing software. The Quickdraw ROM routines have been optimised, making all the strictly drawing routines on average twice as fast, although isolated cases such as the drawing of vertical lines within a rectangle are now five times faster. Another area of improvement is the positioning of text. With the advent of the LaserWriter it is possible to position the text to much greater precision; the ROM allows you to specify a fractional spacing for text, although this of course will not be visible on the Mac screen.

It's when you start using the Mac Plus for running applications that you really appreciate the power that double memory and disk capacity has opened up. The whole system runs a lot sweeter and faster, disk swaps are much less frequent, and the majority of spreadsheets are held within RAM making them far quicker in calculation. With the Switcher (a program from Apple that holds multi-





The first Australian Macintosh Business Centre

★ Working Macintosh Office Demonstration and Seminar Centre. Featuring networking, printing, communications and complete software solutions in operation.

★ One-Source evaluation, equipment supply and training solutions for Australian business. Staffed by DP and business administration professionals.

★ Largest range of Macintosh software for evaluation and sale.



Authorised Dealer

LOGICAL SOLUTIONS
55 Mountain Street, Broadway, NSW 2007
Telephone: (02) 212 6655

Macintosh is a trademark licensed to Apple Computer Inc. Apple and the Apple logo are registered trademarks of Apple Computer Inc.

CHECKOUT

ple applications active and within memory, allowing you to rapidly switch between them) you can now use all your favourite applications simultaneously and in an intelligible way.

The million dollar question as far as many users are concerned is: What about compatibility? There are two areas where incompatibility may occur — the hierarchical filing system and the new ROM. Having run most of the applications in the APC office, it seems that the new ROM is faultless, but the applications that failed with the Hard Disk still fail on this latest revision of the hierarchical filing system. This includes many of the public domain utilities and, more worryingly, a large number of the programming packages. You can, however, expect the majority of software houses to modify their software so that it does run and make it available at a nominal charge.

Documentation

A couple of sheets of documentation floating down to lie beside a Mac might make a good television advert, but even with the admittedly excellent Macintosh environment it isn't enough. Happily the

manual included with the Mac Plus stretches to at least 100 pages, and makes a very competent effort to cover all the aspects a novice Mac user might need to know about. Having said that, the Macintosh Plus is still very much a machine that I would encourage a novice user to play with before going near any documentation.

Prices

The Mac Plus will retail for \$4495 including sales tax (that's \$100 more than the current price of a 512k Mac, though the 512k Mac is due for a price drop). This price does not include MacWrite and MacPaint which have to be purchased separately for \$175 each.

Existing Macintosh owners who wish to upgrade will pay \$695 for the disk drive kit; \$1345 for a logic board for the 512k Mac and \$1845 for the 128k machine; and \$275 for the keyboard kit. The external 800k disk drive will retail for \$795.

Conclusion

When the original Macintosh was launched I was impressed — very

impressed. After realising that one wasn't going to appear on my desk for a while, I found sufficient grumbles to enable me to continue happy use of the big, fat and ugly IBM PC that currently occupies most of my desk.

Now, due to the Macintosh Plus, all those criticisms have gone, and I seriously doubt that I'll ever be satisfied with the PC even when it's trying hard to behave like a Mac.

The Macintosh Plus can best be described as an evolution of the original Macintosh design. It is particularly gratifying to see that Apple has heeded the most frequent criticisms of the original design — the memory and disk size — and rectified them.

Some people may be disappointed that it's not the colour, slotted Macintosh they expected: to them I say sit down with a Mac Plus and see how it has matured.

I just hope it's not too late to persuade the business micro buyer that the Mac Plus can now do far more, far easier and cheaper than any PC or PC/AT, because it really can.

END

THE A1 PC AT AN OK PRICE.

The new Commodore PC has arrived.

It sets a new standard in microcomputer technology at an affordable price.

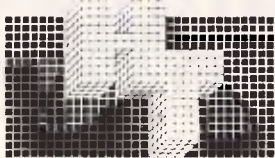
As an authorised Commodore dealer, not only can we sell you your new computer, but we can also maintain and service it for you too.

Naturally, full software support is available.

Our staff at High Technology will also ensure that you get the maximum use out of your computer as quickly as possible.

We believe that buying from the 'right dealer' is as important as buying the 'right computer'.

When it comes to computers, you'll find us right on the button.



HIGH TECHNOLOGY COMPUTER SYSTEMS PTY. LTD.

290 Bay Street, Brighton. 3186. Phone: 596 6211.

Electronic Database/Shopping (03) 596 2340.

When Olivetti specifies them you know they're reliable

TANDON AND DTC FROM MICRO GENERAL

No dealer's ever regretted going first-class with the disk drives he installs. After all, who wants future service problems? Tandon and DTC — world famous for quality identical to manufacturers' own equipment — are proven 100% compatible with all major micros: IBM, Olivetti, Ericsson, Sanyo, NCR, Canon, etc.

Best yet! Check Micro General's special *low* prices — they give you that edge you need to offer the best deals for less.

MICRO • GENERAL



10, 15 and 30 MB

10 MB, 40 MB

22MB formatted.

115 Church Street,
Camperdown 2050.
Tel: 550 2333.



DTC Controller

SEE US AT PC 86 STAND NO 913

8087 Co-Processors

256K DRAMS

64K DRAMS



BANKS' STATEMENT

Last rites

Martin Banks considers the rather hysterical actions of Apple in its bid to sue over the Macintosh copyright.

It was a dark, chilly night as the ghost of Charles Babbage rose from its resting place to stalk the halls of Lincoln's Inn Fields, the heart of London's legal community.

The ghost had a mission of the utmost seriousness. It had felt the vibrations out on the astral plane, and had sensed the injustice building gradually within it. Now the time had come to strike. If others could do it and win, then who had a better claim to the same victories than Charles Babbage? The ghost was intent upon gaining them.

In Lincoln's Inn Fields it found what it sought: a legal mind skilled in the arts of copyright law. With a gentle puff of icy breath the legal mind was brought sharply awake, stunned by the apparition that stood at the end of the bed. The apparition, once it was sure that this fine legal mind was fully roused, spoke.

'Listen, I have a job for you. I want you to sue every company and every individual that has ever made a computer, ever thought of making a computer, or ever wondered if it might be possible one day. I, the ghost of Charles Babbage, the inventor of the first computer, claim the copyright on the whole damned thing.'

The fine legal mind, having rapidly digested this information, suggested that there might be problems with legal precedent, or the lack of it. 'The precedent exists,' said the ghost. 'Just go seek the Apple.'

Now that might seem just a little absurd, even though poor old Charles Babbage did invent a computer long before anyone else (he called it a 'difference engine', which has a much better ring to it than PC, but never mind). Only the lack of money and mechanical engineering skills prevent it working in practice.

On that basis, he or his descendants, including his ghost, have the legal right to sue just about everyone for coming up with a similar idea. OK, so they did it a different way by using electronics and stuff, which was cheating. He, however, came up with the idea.

Such a suggestion seems about as logical as the recent happenings at

Apple, already reckoned by some to be among the most litigious companies the computer industry has ever spawned. It is a company that has produced some great ideas in its time, and some interesting applications of those ideas, especially in the form of the all-conquering Apple II and the later Macintosh.

Part of that computer, and its predecessor, the now-defunct Lisa, is a graphics and icon-based interface that transformed the way in which users communicate with the machine. Together with the mouse, you can point to what you want with the cursor, click a few buttons and be into a file or performing a task without having to dabble in quirky command lines. This, not surprisingly, has been universally hailed as a 'good idea'. As such, of course, it is not subject to copyright.

This is, presumably, somewhat to Apple's chagrin, for the company is keen to protect its rights and position by recourse to the legal profession. It has done it in the past, quite correctly from a legal point of view, with moves to stop Far East manufacturers from gatecrashing the Apple II market with cheap hardware.

Certainly these machines were various degrees of a rip-off, but this has left Apple as the sole contender in its own market-place, which is big but not going too far these days. IBM, on the other hand, has let others build clones and compatibles based on a publicly available operating system. The result has been that IBM is now sitting at the top of a much bigger market-place that is going somewhere.

Now, Apple is on the legal trail again over the Macintosh interface. Its legal action against Digital Research (DR) seems, to an outsider, to border on the petulant. DR came up with GEM, another graphics-and-icons interface. The difference, as we all know, was that it was designed for the PC market, where such a thing was urgently needed. It also followed the pattern set out by Apple with the Macintosh interface; after all, why re-invent the wheel?

GEM works in a different way to the

Macintosh, so it couldn't be touched as a direct copy. Apple, therefore, claimed copyright of *how* it looked. This is despite the fact that the Macintosh system works only in black and white, while GEM is in colour. Its contentions are apparently based on a legal precedent set in a computer games case between *Atari and Bally-Midway vs Magnavox* over a Pac Man rip-off claim.

This is a test defined at that case which is generally referred to as the 'stand 10 feet away and squint at it' test. If something looks similar under these circumstances, you sue.

Using this legal principle, DR can definitely get its own back by suing Microsoft (before Apple gets to Microsoft over MS-Windows looking the same as the Macintosh — Apple is said to be 'looking' at Windows already). DR could sue, quite justifiably, for the visual similarities between CP/M and MS-DOS. Damn it, the A> is exactly the same.

Let's take it to the logical absurdity. I shall now sue my colleague Guy Kewney for writing about computers in 'Newsprint' and, at the same time, for having a beard. At 10 feet, people have been known to confuse us.

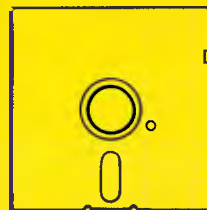
As has been pointed out, the basis of Apple's case is tenuous at best. Apart from anything else, the Macintosh interface is itself a rip-off of the original SmallTalk system produced by Xerox; Xerox hasn't bothered to sue anyone. Another factor is the point that, as one US observer succinctly put it: 'I'm not sure you can copyright a picture of a garbage can.'

Quite why Apple spends its time suing all and sundry is beyond me. As IBM has shown, the way to grow is to have everyone using the same things (that is, PCs). That way, there is more market for everyone. Apple's current legal activities have been likened, perhaps unkindly, to the writhings of a dying man, slashing out at all and sundry. Certainly the Apple legal department is one part with something still to live for.

END



DISCWARE



Super Specials for this month only

Timeline ver. 2 \$760.00 this month only **\$569.00**
 SmartKey 5 \$79.95 this month only **\$66.00**

Smart 1234 modem \$1907.00 this month only **\$1500.00**
 Microsoft Mouse ver.5 \$279.00 this month only **\$220.00**

IBM Software (sales tax included)

	R.R.P.	Our Price
Attache accounting	call	call
Borland's Superkey	149.00	99.00
Cash Desk***	725.00	555.00
Clipper Compiler dB III	995.00	call
Concurrent PC DOS 4.1	555.00	399.00
CopyIPC	95.00	85.00
Copywrite	125.00	95.00
CPA+***	795.00	670.00
Crossstalk XVI	249.00	149.00
dBase III***	976.00	685.00
Easy!	240.00	215.00
Enable	1100.00	730.00
Flight Simulator ver 2.12	115.00	89.00
Framework***	1095.00	775.00
Gateway Viatel	199.00	170.00
GATO Wishbringer, King's Quest	ea 69.00	ea 65.00
GEM DRAW/DESK TOP	395.00	315.00
GEM Write/Paint	340.00	285.00
Graffiti***	670.00	570.00
Harvard Total Project Manager***	649.00	490.00
Hi-Tech C Compiler 8088/86	300.00	280.00
Human Edge Mind Prober	69.95	50.00
Information Business Manager	540.00	440.00
JET: fly an F.18	99.00	80.00
Keyworks	165.00	129.00
KnowledgeMan 2.0***	945.00	715.00
Lattice 'C'	790.00	690.00
Lotus 123 rel. 2.0	835.00	565.00
Microsoft Multiplan	379.00	269.00
Microsoft Word***	599.00	429.00
Microsoft Word + Mouse***	799.00	599.00
Milestone	401.00	239.00
MultiMate 3.3	645.00	519.00
Newsroom	89.00	75.00
Norton Utilities 3.1	199.00	129.00
Notebook II	350.00	295.00
Open Access IBM/NEC/Wang***	995.00	725.00
PC Alien	95.00	80.00
PC Tutorial	50.00	42.00
Perfect Filer	325.00	245.00
Perfect Link	189.00	159.00
Perfect Writer	359.00	299.00
Printshop	89.00	72.00
Printworks	149.00	139.00
Reflex	199.00	169.00
Remote	239.00	169.00
Samna Plus/Samna III	fr 795.00	fr 635.00
Side Kick ver.1.5	99.00	72.00
Sideways	95.00	79.00
SmartKey	79.95	67.00
Smart Software System 2.0	1045.00	845.00
Spellbinder	795.00	559.00
Supercalc 3 ver 2 w/Fast Math	675.00	419.00
Sybiz accounting	call	call
Symphony 1.1	1095.00	705.00
Think Tank	349.00	270.00
Timeline*** ver 2.0	760.00	599.00
Transporter	319.00	269.00
Turbo CAD***	1299.00	990.00
Turbo Gameworks	129.00	99.00
Turbo Graphix Toolbox	99.00	80.00
Turbo Lightning	190.00	150.00
Turbo Pascal 80B7, BCD	125.00	fr 89.00
TypeQuick	77.00	72.00
VTEX Viatel s/ware IBM/NEC/Wang	190.00	170.00
Word Perfect	685.00	515.00
Wordstar	575.00	339.00

IBM Software (sales tax included)

	R.R.P.	Our Price
Wordstar 2000	595.00	455.00
Wordstar 2000+***	795.00	460.00
Wordstar Professional	595.00	455.00
Software not listed: call for best price	call	call

MACINTOSH/APPLE

	R.R.P.	Our Price
Auto Ice viatel modem	395.00	375.00
Jazz	899.00	599.00
Logo	295.00	225.00
Microsoft Excell	750.00	530.00
Microsoft File or Word	@330.00	@ 290.00
Microsoft Multiplan	325.00	255.00
Newsroom	89.00	62.00
Omnis 3	730.00	589.00
PFS Write/File/Report/Graph	@175.00	@ 144.00
Printer card	130.00	75.00
Print Shop + Graphics Library	125.00	99.00
Quickset	170.00	99.00
Turbo Pascal/Turbo Toolbox CP/M	@125.00	@ 99.00
Zardax	200.00	150.00

DISKS

	R.R.P.	Our Price
1.2 MB disk for AT	120.00	75.00
3.5 micro floppies	75.00	55.00
Fuji	79.95	37.00
Xidex DSDD	65.00	40.00

IBM Hardware (sales tax included)

Intel Above board	\$569.00
64KB buffers	\$285.00
8087	\$269.00
AST 6Pak with Sidekick	\$569.00
Easy LAN starter kit	\$279.00
Hercules Graphic card	\$699.00
Irwin 10MB tape external	\$1675.00
Irwin 10MB tape internal	\$1290.00
Microsoft Mouse	\$240.00
Qubie 10MB hard disk	\$1090.00
Qubie 20MB hard disk	\$1190.00
Qubie 44MB hard disk	\$2700.00
Qubie 4x4 Plus card	\$790.00
Qubie 6Pak	\$379.00
Qubie color monitor	\$699.00
Sigma color 400	\$1150.00
Sigma Maximizer AT	\$650.00
Sigma Maximizer PC	\$449.00
Sysgen 60MB tape	\$1990.00
Tandon 10MB hard disk	\$1150.00
Tandon 20MB hard disk	\$1290.00
Tandon 42MB hard disk	\$3200.00
Taxan Super Vision III	\$765.00
Taxan Super Vision IV	\$1050.00

Modems

NetComm Smart 1234	\$ call
DataSat Viatel modem	\$359.00
Netcomm In/Modem	\$499.00
Netcomm Smart 1200	\$829.00
Netcomm Smart 123	\$ call
Netcomm Smart 2123	\$589.00
Netcomm Smart 2400	\$1149.00

Printers (sales tax included)

Brother M1509	\$689.00
Epson FX100+	\$899.00
KEL 3080 (18 pins)	\$525.00
NEC ELF Spinwriter	\$699.00
NEC P2 Color	\$1150.00
NEC P3 Color	\$1450.00
NEC P3 Pinwriter	\$1199.00
NEC P5 Pinwriter	\$1840.00
NEC Spinwriter 2000	\$950.00
NEC Spinwriter 3500	\$1690.00
NEC Spinwriter 8800	\$2790.00
Toshiba P1340	\$860.00
Toshiba P1351	\$1450.00
Toshiba P351 Printer	\$1740.00

Computers

Kaypro 286i System 1	\$4950
512KB, 1.2MB floppy, Taxan mono screen	
Kaypro 286i System 2	\$5950
512KB, 1.2MB floppy, 20MB hard disk, Taxan mono screen	
Kaypro 286i System 3	\$11800
512KB, 1.2MB floppy, 44MB hard disk, Taxan Super Vision IV, Sigma color 400, 60MB Sysgen tape	

Free catalogue! Discware have just produced a complete catalogue of IBM software and peripherals. Call for your copy today.

*** demo disks available at cost, please enquire.

Call for specials and sales-tax exempted prices: (02) 212-6933, Viatel Order by phone, Viatel or send cheque or money order to: DISCWARE, 6th floor, 3 Small Street, BROADWAY NSW 2007 TLX: AA23509.

For all products not listed call (02) 212-6933, or 212-6552. Viatel ★ 778 000#

All products carry full warranty. We support what we sell. All products are latest release versions. Delivery extra.

Software from Arcom Pacific, Imagineering, SCA, Microsoft, Digital Research, Sourceware, Software Source, Intelligence, MicroPro, Ashton-Tate, Sorcim and others.

COMPUTERS AND SOFTWARE BARGAINS

Telephone: (02) 212-6933

Viatel ★ 778 000#

TLX: AA23509

DISCWARE, 6th Floor, 3 Small Street, Broadway NSW 2007.

If you are impressed by our prices and our product range, you would be even more impressed if you knew who some of our clients are:

BHP, Burns Philp, Commonwealth Bank, CSIRO, CIG, TAA, Telecom...

Why do some of Australia's top companies come to Discware for their computing needs?

Is it because our prices are the lowest in the industry?

or is it because we offer fast service, professional advice and an unmatched range of equipment and software from the world's leading companies: **Olivetti, Kaypro, Toshiba, NEC, NetComm, Intel, Lotus, Microsoft, Borland, DRI, Imagineering...**

Call Discware today to find out.



Now, there's an alternative: the Olivetti-AT&T computers

Olivetti M24 Twin Disk Drives \$3800

640KB RAM, 2 x 360KB floppy disk drives, hi-res green or amber monitor, parallel and serial ports, 6 month warranty.

Olivetti M24 Hard Disk \$4900

640KB RAM, 20MB internal hard disk, 360KB floppy disk drive, parallel and serial ports, hi-res green or amber monitor, 6 month warranty.

Olivetti M24 SP \$ call

8086 @ 10MHz, 640KB, 20 MB, limited stock.

Olivetti M21, the portable alternative \$3900

640KB RAM, 2 x 360KB floppy disk drives, built-in hi-res monitor, parallel and serial ports, 6 month warranty.

Enquire about our bundled software packages:

Open Access, Enable, Symphony, Lotus, Framework, Perfect, Smart System



Free 512KB upgrade with first 5 Kaypro PC's sold this month.

Kaypro PC

the made-in-USA PC/XT compatible computer that's the price/performance trendsetter. **from \$1595**



Kaypro 2000 \$2995.00

8088 CPU, 256KB (768KB option + \$50.00), 8087 option, 720KB 3.5" floppy, real-time clock, bundled software.

Toshiba T1100 \$2895.00

256KB RAM, 3.5" floppy, RGB.

Kaypro 2 \$1650

Z80 CPU, 640KB, twin 200KB disks, monitor, bundled software.

Kaypro 2X \$1700

Z80 CPU, 64KB, twin 400KB disks, monitor, complete with bundled software.

Kaypro 4 \$1950

Z80 CPU, 64KB, twin 400KB disks, monitor, modem, clock, bundled software including dBase II.

8088 CPU, 256KB RAM (768KB option), std, 360KB drives, multi-video board, 9 slots, 135W power supply, hard disk option, AT-style keyboard and enclosure, serial & parallel ports, MS DOS & GW Basic.

Kaypro PC Twin Disk Drives \$1995

Kaypro PC Hard Disk \$3395



ICL Quattro

The multi-user market is still an open one, with no definitive system as yet. ICL is attempting to fill this gap with the Quattro, a multi-user development of the Rair Black Box. Nick Walker tests its suitability as a small-business alternative to networked stand-alone micros.

With the current interest in networking stand-alone micros, it is all too easy to forget the alternative of purchasing a multi-user system from the onset. By the time you've bought the separate micros and the necessary network cabling and

software, the total cost of the system can often come as a shock. If you have to buy a computer system for a small number of users, one of the most attractive propositions — and quite often one of the cheapest — is to go multi-user.

One company that has been in the business of providing small multi-user systems for many years has been ICL. Its latest offering in the multi-user micro field is the Quattro. This machine is a development of earlier ICL PCs, which in



turn are developments of the famous Rair Black Box.

The name Quattro didn't strike me as the most original name for a new product. Apparently the machine is named Quattro as it supports up to four users, each user running up to four programs simultaneously. Four by four = Quattro — obvious, really.

Hardware

As someone who gives a large proportion of desk space to an IBM PC, the ICL Quattro doesn't seem too large to me: the main unit is a large, pale brown box with a footprint slightly larger than the IBM. But it certainly isn't a small box, and although it could at a pinch sit on someone's desk, I certainly wouldn't like to be the one who had both the terminal and the main system box on my desk. The machine would benefit from a table of its own or from standing on its side at the side of a desk, and once it's there you'd be well-advised to keep it there as it weighs over 27kg.

The front of the machine is plain — the review machine had a single small ICL label in the top left-hand corner, and below this is a single green power-on LED. Judging by the literature, there will be a go-faster Quattro sticker on the final production machines. To the right there is a single floppy disk drive and a small black panel that covers the hard disk.



The Quattro can work with virtually any remote terminal



The keyboard is well pitched and has 102 keys of various shapes, sizes and colours

The bottom-of-the-range machine, the Model 19, has two floppy disks rather than the one hard, one floppy configuration found on the rest of the range.

The rear panel is rather more interesting. To the right is a bank of eight ports, consisting of six asynchronous RS232 ports for up to four workstations, leaving the remaining ports free for printers, plotters, modems or any other peripheral you fancy hanging off the back. The other two ports are an RS422 port, allowing you to form a network of Quattros, and an RGB port. This is not for an RGB monitor as you might expect, but for the connection of a video system to create slides, or a projector to show them.

To the left there is a large fan. This is reasonably quiet and went unnoticed in my office, although it may prove a little irksome in a quiet office. To the left of this is a non-standard synchronous port to give the necessary links to ICL and even IBM mainframes. At the far left-hand side is the power-in socket, on-off switch and a reset switch.

Getting inside the machine is easy — remove four small side screws and the lid slides forward and off. Once inside, a rack of PCBs is revealed to the left, with the hard and floppy disks to the right. To the rear at the right is the power supply.

There is no motherboard inside, just a bus running along the front left-hand corner which contains all the boards necessary to make the thing into a full working computer system. Although many people applaud this kind of open architecture, it does suggest a certain lack of permanence; a quick change of processor board and you have next year's model with the minimum of cost. Among the advantages of this arrangement, however, are the ease of memory expansion and the ability of the machine to accept special-purpose cards should ICL manufacture them.

From left to right the boards are serial I/O, three RAM cards, one processor and ROM card, a floppy disk drive controller and a card containing some miscellaneous hard disk circuitry (not a hard disk controller). The Quattro's processor is an 80682, Intel's go-faster version of the 16-bit 8086 being driven at its limit of 8MHz. On the review machine this was complemented by a 8087 maths coprocessor, which is optional on the retail machine. Other than this there are a couple of ROMs and the usual TTL circuitry found on any processor board.

The floppy disk controller card betrays the machine's origins and age, being labelled 'Rair 1981'. ICL claims that this shows how good the original Rair Black Box floppy disk controller was, but I'm not convinced. Surely floppy disk tech-

nology must have advanced a little in the last four years.

Next to the floppy disk controller is a card that I originally believed to be a hard disk controller, but on closer examination it turned out to be no more than a few TTL chips with a cable connected to the hard disk. In fact, the hard disk control circuitry is in two PCBs under the physical hard disk. The three RAM cards are nothing very exciting, being based on 64k x 1-bit DRAM chips and each offering a total of 256k, with the maximum of four cards equalling the physical addressing limit of 1Mbyte. The serial I/O board is the most densely packed, containing all the necessary circuitry to drive the aforementioned bank of I/O ports.

The Quattro is supplied in three models, labelled Model 19, Model 39 and Model 49, with the main difference between each being the disk drive configuration. The bottom-of-the-range Model 19 has 256k RAM and two 800k floppy disk drives: the Model 39 and Model 49 have 512k RAM, one 800k floppy and 10Mbytes or 20Mbytes 5¼in hard disks respectively. The review machine, a Model 49, had a Rodime, 20Mbytes hard disk which was rather slow compared with other hard disks, but according to ICL this is the price you pay for maximum reliability. The drive behaved faultlessly during the review, so it may have a point.

The Quattro can be made to work with virtually any remote terminal. Two terminals are recommended by ICL, and were supplied with the review machine. The first of these has the snappy title of The 6402G Monochrome Workstation. It reminded me very much of the kind of terminal you find connected to large mainframes, being both large and ugly and yet of undeniably high quality. The second terminal recommended by ICL is The 6404CG Colour Graphics Workstation, and is even larger and uglier than its monochrome brother. Both terminals are almost identical in terms of function, keyboard and external ports, with the colour version offering

eight colours when in graphics mode.

The keyboards have 102 keys of various shapes, sizes and colours. All the keys are full-stroke and the keyboard is well-pitched, but if that isn't enough you can flip down two bars at the rear to increase the typing angle.

The main qwerty area occupies most of the space, with a numeric keypad to the right; both are coloured a similar light brown to the terminal casing. Surrounding these in a much darker brown is a host of control and function keys. At the very top of the keyboard is one long row of 11 function keys, seven text processing keys and a single key marked 'Set-up'. Pressing this key will take you into a terminal set-up screen from which you can configure the terminal for connection to any computer system.

In terms of display quality there is little to criticise with these ICL terminals. Apparently there was a fault with the review machine's monochrome screen display, but it's still one of the best I've seen. Both terminals are capable of a graphic resolution of 640 x 400 pixels with the appropriate software loaded, and both terminals could be tilted and swivelled into a comfortable operating position. At the rear of the terminals are two sockets, one for connection to the host system and a second for the connection of a printer. This second socket can also accommodate ICL's mouse, and a number of applications have been customised to use this feature. Overall, I liked the operation of these ICL terminals; it's just a shame they look so awful.

Four printers are sold by ICL for use with the Quattro: a dot-matrix, a daisy-wheel, a colour thermal printer and a printer/plotter. All the printers are re-badged proprietary makes, and the one supplied with the review machine was a thinly-disguised Oki-mate 20 — a tiny home computer colour thermal printer and not really the kind of thing you'd expect with a multi-user business system.

System software

The ICL Quattro, after initial configuration, will boot automatically into its operating system which is Concurrent CP/M-86. Switch on the machine and the terminal connected to serial port 0 will be covered in spurious junk as the machine goes through numerous self-tests. Eventually the screen clears and you are left with a copyright message from Digital Research and the infamous A> prompt.

Concurrent CP/M, now called Concurrent DOS, was introduced as Digital Research's answer to Microsoft's

Benchmarks

BM1	0.7
BM2	2.2
BM3	4.9
BM4	5.0
BM5	5.9
BM6	10.9
BM7	15.7
BM8	17.6
Average	7.8

All timings in seconds. For a full listing of the Benchmark programs, see Benchmark roundup.

THE KCM 1986 CALENDAR



If postage required, allow \$2.50 for postage & handling.

THE "KCM" MODEMPHONE DESIGNED BY KCM

TO PUT "VIATEL" IN YOUR REACH!
(Introductory Offer)

Unbelievably
Priced at Just

\$269⁰⁰!!!



INCLUDES "INTERLINK" Viatel Software!

FOR IBM PC's, Apple II+, IIe, IIc*.
*Add \$35 for IIc cable modfcr.

Fully "VIATEL" COMPATIBLE
300bps & 1200/75 bps

NEC 20 MEG H-DISKS
— C/W CONTROLLER —

\$1350⁰⁰

— ONE MONTH ONLY —

KCM PROUDLY ANNOUNCES THE 1986 RELEASE OF THE INCOMPARABLE "MAC-XT/TURBO" "IBM" COMPATIBLE NOW YOU DON'T HAVE TO COMPROMISE QUALITY FOR PRICE!

WHY "MAC-XT/TURBO"?

1. **A DUAL CLOCK SPEED 4 LAYER MOTHERBOARD**
Gives high speed performance with ultra high reliability.
2. **A 50% IMPROVEMENT IN PROCESSING TIME IS REALISED.**
3. **FULLY MANUFACTURED IN JAPAN** — Assembled & Tested in **AUSTRALIA** BY KCM, Your assurance of reliability.
4. **12 MONTH FULL WARRANTY!**
5. **"MAC-XT/TURBO"** — A proven system. Now distributed throughout A/Asia, Europe & the Middle East.
6. **ALL SERVICING & SUPPORT IS CARRIED OUT BY KCM's OWN ENGINEERS.**
7. At KCM Customer support is **PRIORITY ONE!**
8. **FULLY LICENSED "PC-DOS 3.10" IS SUPPLIED** (Full compatibility Assured)
9. The **"MAC-XT/TURBO"** Comes Fully Documentated.
10. The **"MAC-XT"** is **NOT** a **"CHEAP"** Compatible. It is a superbly designed computer which will give many years of service.



- FEATURES —:
- 4.77 & 7.33Mhz (H/Ware Switch.)
 - 640K RAM.
 - System Re-Set Switch
 - 2 x DSDD Drives
 - C/Graphics card
 - Multi I/O Card, (Serial, Parallel, Games port & Batt. Backed Clock).
 - 135W power Supply.
 - U.S. Made "HI-TEK" Keyboard.



OUR BRAND NEW ADDRESS...
380 Victoria Street,
Richmond, 3121.
Tel. (03) 429 2733

\$1,995.00 Inc. Tax.
— Save \$200 Off Normal Price! —

... **Master Hardware & Software Engineers,
Importers, Manufacturers.**

BENCHTEST



An interesting rear view: up to four workstations can be connected

domination of the 16-bit operating systems market. As the name suggests, with Concurrent you can perform a number of tasks simultaneously and switch between them as required with the background tasks still running.

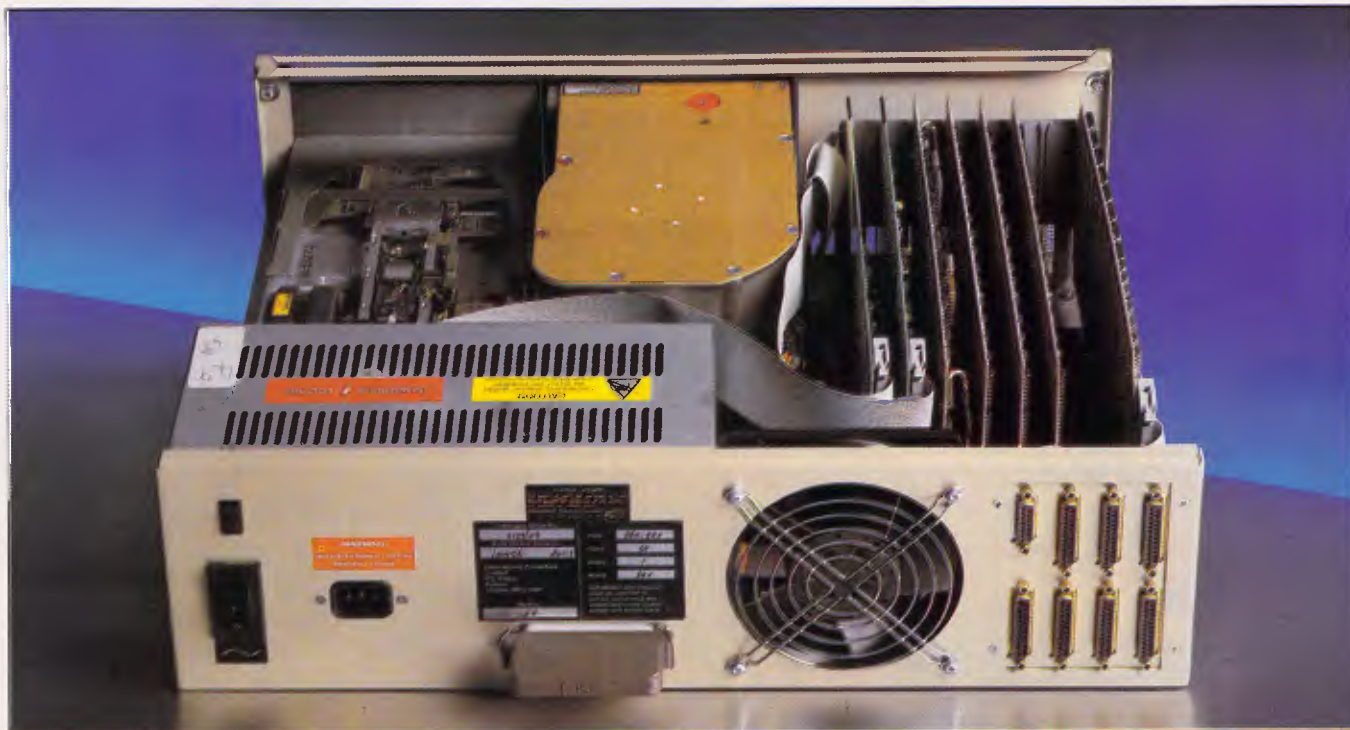
The version of Concurrent on the ICL had not only to be multi-tasking but also multi-user, and it's interesting to see how this problem has been tackled on the Quattro. With a single-user system Concurrent provides four virtual consoles, and switching between them is done by pressing a suitable function key followed by either 0, 1, 2, or 3. Concurrent on the Quattro controls a total of 16 consoles simultaneously, and allocates four to each user, so one user has

tasks 0, 1, 2 and 3, the second user has tasks 4, 5, 6 and 7, and so on. This sounds all right until you realise that tasks higher than 9 are numbered in hexadecimal so that the third user has tasks 8, 9, A and B, and if you're unfortunate enough to be the fourth user on the system you'll be lumbered with tasks C, D, E and F.

Having accepted the slightly perverse numbering of the Concurrent tasks, the system performs well. It does seem a little old-fashioned, with each task occupying a full screen (I'm a great fan of windowing systems used in conjunction with multi-tasking). I don't expect that many users will be using all four terminals with each terminal running four

tasks, and it's just as well. The system slows considerably at approximately six tasks unless they are all using different resources. The main bottleneck seems to be accessing the hard disk, as two disk-intensive tasks really slow the system. I suggest that the system be run with four users only if all the applications are fairly light in terms of computing power required. With intensive use such as program development, the machine would probably be better suited to two users at a time. Don't be fooled by the Benchmarks, as these were taken with nothing else running on the system.

Concurrent DOS version 3.1 is supposed to support a PC mode, giving some compatibility with IBM PC soft-



There is no motherboard — which has its advantages

ware, but sadly this was missing from the Quattro's version (also supposedly version 3.1). This is a great shame, as it would have made the machine somewhat more desirable. All that's left of the PC mode on the Quattro is a utility that allows the floppy disk drive to read IBM PC disks, giving data file compatibility—I suppose it's something.

A number of extra features is included as part of the system software, increasing its usability as a multi-user system. The first of these is a RAM disk facility. Any amount of RAM, from 18k to 764k, can be set aside to act as a RAM disk. I'm not a fan of RAM disks; it worries me to think of all that heavily-processed information sitting volatile in RAM. A RAM disk on multi-user systems, however, means that the system can be configured to spread the load more evenly over a number of resources.

The second and most useful facility is a print spooler. With four users, it's quite possible that they will need to use the printer simultaneously. The spooler system will take each request for printing and form a queue of files to be printed, leaving the users free to perform other tasks.

Taking me back to my university days, when I used an ICL mainframe, was the

'Help' facility. One enormous file on disk contains online help on practically every aspect of the system. Typing HELP followed by whatever you're having trouble with results in a few screens of help information—90 per cent of the time. If you are unfortunate enough not to be able to specify the thing you are having trouble with, typing HELP alone will lead you into a menu of subjects, each leading to sub-menus and finally to the relevant text. All in all, a very useful facility.

An equally enormous file is the Learn file; typing LEARN from the A> prompt will take you into a giant online Quattro tutorial. Potential users should ideally run through this, but, be warned, it takes over 10 hours to complete but only half an hour to become bored with its tedious technical style.

Applications software

The use of Concurrent DOS means that a wide range of software is readily available, albeit not quite the wealth of software that is available for the 8-bit version of CP/M. The majority of the business packages that run on the IBM PC and its clones started life as CP/M

software, so you will have no difficulty obtaining such classics as WordStar, dBaseII or Lotus 1-2-3, but you won't find some of the more modern packages such as Framework, Symphony or dBaseIII. As you would expect, Concurrent DOS runs all applications written for its single-tasking brother, CP/M-86.

It's good to see ICL actively persuading software manufacturers to customise applications to run on the Quattro. On the review machine, WordStar, GSX Graphics and DR Draw were thus customised to take advantage of the Quattro's facilities. No applications software is bundled with the machine, but a software catalogue is provided which lists hundreds of applications that can be run on the Quattro.

Documentation

Open the box containing your new, shiny ICL Quattro and you'll be greeted with an enormous sheet of card informing you in big, easy-to-read letters how to set up the machine, complete with a colour illustration showing you where to plug in the cables. It's a laudable attempt to persuade users to read the documentation before connecting the bits together, but

COMPUTER GRAPHICS? DRAW ON OUR EXPERIENCE

Now you can turn your computer into a graphic workstation. Whether you are into graphic art, Computer Aided Design, excellent business presentations, or just having fun—Summagraphics Digitizers from Minicomp will give you the perfect picture every time. And it is as easy as putting pen to paper!

Summagraphics' extensive range of digitizers are compatible with your machine and run with a large selection of software. AutoCAD, Dr Draw, GEM, Mirage, TopView, Macpaint, and MacWrite to name a few. All this plus the

latest technology which offers resolution of up to 1000 lines per inch.

We even have a tablet designed especially for the Macintosh called MacTablet. Just plug it in and realize the full potential of your Macintosh's exceptional graphics. MacTablet's pen stylus performs all the functions of the mouse yet is far simpler to use—its like the difference between drawing with a pencil and drawing with a round of Camembert. Tracing an existing drawing into the Macintosh is easy—you can trace from originals up to 1/2 inch thick.

Ask your dealer to show you how a Summagraphics digitizer from Minicomp will turn your computer into an exciting graphics system.

Solely distributed by

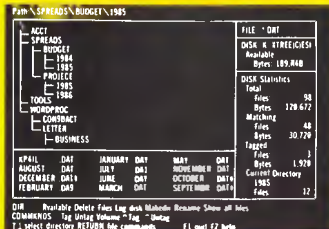
Minicomp
SOFTWARE & EDUCATION PTY. LTD.

Minicomp Building
104 Mount Street, Nth. Sydney 2060
Ph: (02) 957 6800



**NEW SOFTWARE
FROM USA**

IF YOUR COMPUTER HAS A HARD DISK...



You need the new standard for File and Directory Management

XTREE simplifies file and directory handling by providing single keystroke commands to access, delete, rename, view, move, list, or show all files within any and all directories. XTREE displays a graphic picture of your directory organization, instantly shows all the files in each directory or all files across all directories. Easy to use, just point with the arrow keys (full scrolling and paging in all windows) and press a key. Menu clearly displayed at all times.

FEATURES

- ★ Shows **ALL** files or groups of files in **ALL** directories in one sorted display.
- ★ Copy, delete or rename multiple files in different directories in **ONE** operation.
- ★ **ALL** vital disk and directory statistics updated and on screen at all times.
- ★ Rename any sub-directory.
- ★ Multiple file rename with wild cards.
- ★ Change volume name without reformatting.
- ★ Full scrolling and paging in file and directory windows.
- ★ Quick and easy location of all directories and files.
- ★ Automatically copies groups of files across several diskettes.
- ★ Documentation written in clear, concise English.
- ★ **NOT** copy protected.
- ★ List files matching any file specification.
- ★ Sort files by name, size, extension or time and date.
- ★ Move files quickly from one directory to another.
- ★ Print out all files on entire disk — organised by subdirectory including name, size, date, etc.
- ★ View contents of all your files.
- ★ On line help screens.

REQUIREMENTS: IBM PC, XT, AT
or compatible with 192K and MS-DOS 2.0
or PC DOS.

ONLY \$99

**Send coupon
NOW!**

XTREE is a trademark of Executive Systems, Inc.

To: **Perfect Information (Australia) Pty. Ltd.**
P.O. Box 946, Crows Nest NSW 2065
Phone (02) 957 6686 or (02) 92 7777

Please send me _____ XTREE's at \$99 each. *Plus \$5.50 overnight express freight*
I enclose my cheque for \$_____ or please debit my American
Express, Diners Club, Visa, Mastercard or Bankcard.

Card expires _____ Signature _____

Name _____

Address _____

Postcode _____

Phone No. _____

APC 2-86

Whale

Megaptera novaeangliae
Endangered Species

Survival's no fluke with great backup: Tallgrass PC/T tape backup. It's the only way to be sure that what's in your computer now will still be there tomorrow.

Lost information is lost business and opportunities. For success, even plain survival, you need backup... a safeguard against loss through accidents, hardware failure and human error. PC/T is Tallgrass' Personal Computer Tape format. It's also the most advanced tape backup system in the world for all IBM PC's and compatibles.

The reasons are simple: firstly, PC/T works like floppy disks but has the high speed and capacity of streaming tape; and secondly, PC/T's correction abilities are second to none.

The differences are remarkable: PC/T is quicker and easier to use, with individual files and a directory. Backup is faster than ever because PC/T applies the speed of streaming to selectively backup your changes without prior erasure. And data is always secure because PC/T automatically reconstructs data from damaged tape.

No other tape backup system is as advanced as PC/T and only Tallgrass internal and external hard disk and tape backup systems have it.

Call Tallgrass or your authorised dealer now to discover just how far you can go when you've got the right backup.



**TALLGRASS
TECHNOLOGIES
AUSTRALIA**

WHEN IT'S WORTH SAVING

Suite 1/34, East Street, Five Dock, NSW 2046
Phone: (02) 712 2010. Telex: AA26981. FAX 7122808

The complete Tallgrass internal and external range is available from authorised IBM, Olivetti, Sperry and other fine personal computer dealers.



Tallgrass is supporting the lifesaving work of the World Wildlife Fund Australia.

PC/T is a registered trademark of Tallgrass Technologies

1675A/FPC/Little

When it's worth saving, it's worth Tallgrass PC/T

BENCHTEST

even so it did seem rather comical.

There are also two manuals in a ring-bound binder — an introductory manual and a reference manual. Between the two of them they manage to exclude all that's important about the system. The front of the reference manual recommends further reading. I'd recommend that you at least read the *Concurrent 3.1 Operating System User Guide* or you'll soon find yourself lost.

Two further books are included: a use-

ful paperback which lists applications that run on the Quattro, with a short introduction to the operation of each; and ICL's *Executive Guide to Personal Computing*. The latter is quite pitiful. I realise that it's aimed at non-computer types, but I get very worried when I read that ICL thinks that micros might be catching on and that it sees the Quattro as pitched somewhere between a Macintosh and an IBM PC. Oh dear, ICL: not very impressive.

Technical specifications (Model 49)

Processor:	Intel 8086-2 running at 8MHz
RAM:	512k
ROM:	40k
Mass storage:	One 5.25 20Mbyte hard disk; one 5.25 800k floppy disk drive
Size:	50.8cms x 40.6cms x 15.2cms
Weight:	27kg
I/O:	Six RS232 serial ports, one custom asynchronous port, one RS422 port, one RGB port
DOS:	Concurrent CP/M version 3.1
Bundled software:	None
Peripherals:	Numerous ICL monitors, printers and so on
Options:	RAM expansion up to 1Mbyte, second 20Mbytes hard disk

In perspective

As a prospective purchaser, you may prefer networking stand-alone micros as opposed to a multi-user system. Alternatively, you might like to consider the current offering from IBM, and hence numerous clone manufacturers, the PC/AT. Its key advantage is the current level of support from software houses, now far exceeding CP/M. My current favourite in this field is the North Star Dimension, as it is the machine most able to cope with multiple users and still offer a high level of IBM PC compatibility.

Prices

The Quattro pricing shows no real desire to be competitive, but it isn't as ludicrous as the pricing of previous ICL PCs. The Model 19 (256k RAM, two floppy disk drives) sells for \$4999; the Model 39 with 512k RAM, one 10Mbytes hard disk and one floppy costs \$8999; and the top-of-the-range Model 49 with a 20Mbytes disk, one floppy and 512k RAM is \$9999.

Monitor prices are rather frightening to micro users: the 6402G monochrome with mouse costs \$2098, and the colour version of the same model is \$3499.

Conclusion

The market for multi-user micros is still very much an open market, with no definite trends at the moment. With an innovative product ICL might have been able to capture some of this market. Sadly the Quattro is not such a product, being little more than yet another development of the Rair Black Box using some of the rarer Rair boards.

Despite ICL's efforts to persuade me that the Quattro will sell to small businesses which would alternatively be considering a number of stand-alone micros, I can't really see it. The Quattro will take its place with previous ICL PCs, selling to corporate buyers who already use ICL mainframes. It's particularly disappointing given that the Quattro is being pushed as the machine with lots of ICL in-house innovation.

END

RUSH IN FOR THE NEW COMMODORE PC WAS ~~\$2240.00~~ NOW \$1999.00

(Monitor not incl.)



© 1985 King Features Syndicate, Inc.

- ✓ Full IBM compatibility.
- ✓ Runs the world's most popular business software.
- ✓ MS/DOS operating system.
- ✓ Memory expands internally to 640K.
- ✓ Backed by the world's number one name in micro computers.
- ✓ Unbeatable value for performance.



commodore PC
THE RIGHT BUSINESS DECISION

FAIRSTAR COMPUTER CENTRE

65 Victoria Rd, Parramatta 2150 Ph (02) 683 4271





XTree

Everyone who has worked with a hard disk under MS-DOS knows the management problems which thousands of files scattered over dozens of directories can present. XTree is a utility designed to address these problems. Ian Davies takes a look.

I always felt that the Lotus 1-2-3 file management facilities were the best thing since paper tape, as no longer did a clean up of old files involve a scrolling directory listing, and copying file names into a series of DEL commands. The Lotus FILEMGR program allowed me to just point and press — but only within the one subdirectory.

XTree, from Executive Systems, extends this concept to encompass all aspects of file management, including subdirectory structures. It provides many useful features, some of which are so indispensable that in the past I have resorted to writing assembler programs to perform similar functions. XTree, however, wraps all this functionality under the one set of menus.

As you can see from the screen dump, XTree divides the screen into three main windows. The first window shows the hierarchical directory structure of the disk, and a cursor may be moved using the arrow keys from one directory to another. For the directory at which the cursor is currently positioned, the second window shows the files, while the third window shows a set of statistics. Immediately, XTree is doing something useful and which no part of DOS

can handle. By moving the cursor from directory to directory, and observing the space statistics for the current directory, one can immediately see where all your precious hard disk space is going.

Pressing the ENTER key moves the cursor from the directory window to the file window and back again. Within each window, selecting particular files or directories is as easy as moving the cursor. In each window, a series of commands can be activated by pressing single characters. These commands provide the normal DOS file and subdirectory management facilities, as well as environmental controls, such as directory sorting, file search conditions and display format. While the command and "menu" structure is nowhere as easy to use as the Lotus approach, it nevertheless becomes quite effective and efficient after a few minutes usage.

Some of the more unusual, but highly useful features include the ability to rename directories, alter the volume name, move files from one directory to another without copying and alter file attributes. Additionally, the disk can be searched "across directories", so if you know you have a file called XYZ*.ASM,

but cannot remember where you put it, XTree can find it for you in seconds. For convenience, groups of files can be "tagged" for processing by group oriented commands — very useful for mass deletions or copying. Files can even be browsed in either ASCII or ASCII and hex.

XTree performs as fast as lightning, due to the entire directory structure of the disk being read into memory upon initialisation. This means that the product can be a little slow to start (around 10 seconds for 1000 files on an XT), but once started, it runs very quickly. DOS commands can be issued within XTree, although upon returning from this 'secondary command processor', XTree re-performs its initialisation to pick up any directory changes.

XTree runs on the IBM PC, XT, AT and compatibles under MS-DOS or PC-DOS, and requires a minimum of 192k of memory. It looks to me as though it would also run happily on some of the less compatibles, as an initialisation program selects between "fast screen mode", where XTree writes direct to video memory, and a slower mode where it uses standard DOS calls. Even the slower screen mode gets along at quite a speed, however. As XTree is not copy protected, there will be no outlandish schemes to prevent you from installing it in the way you desire. The initialisation routine also provides control over the colours and other video attributes in each window.

It's a pity that ESI doesn't also provide a memory resident option, but such an option would mean that XTree could not keep a copy of the directory in memory, and hence would severely impede performance.

At \$99 XTree is a valuable utility for anyone with a hard disk or a fondness for subdirectories. It is handled in Australia by Perfect Information. **END**



Fig 1 The XTree windows and command menu

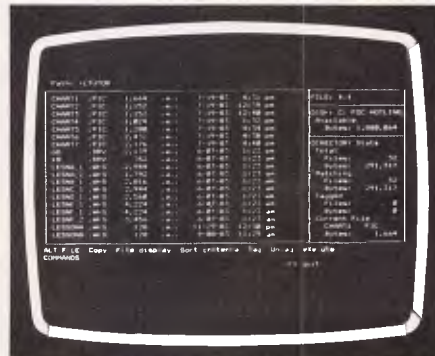


Fig 2 The extended file display complete with file attributes, as well as the alternate command menu.

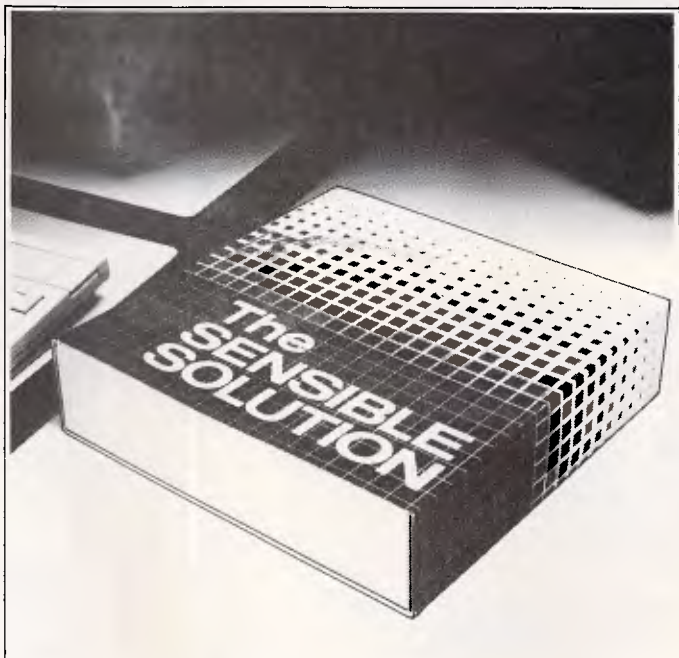


SMART POWERFUL FAST

Sensible Solution will slash your programming time!

This powerful data base and programming tool cuts business application programming by two-thirds. And the speed of the resulting programs is second only to Assembler programs. SENSIBLE SOLUTION programs and files are totally transportable, and limited only by the O/S of the machine it's on.

With single and Multi-user versions with complete record and file locking, Sensible Solution programs are running on most popular networks, inc. Novell, PCnet, 3Com Ethernet, CP/NET & DR/NET. Syntax errors are impossible, and the English language programs are automatically compiled as the screens are painted from the mer u.



'The SENSIBLE SOLUTION'

Compare these features . . .

- | | | |
|---|---|--|
| <input type="checkbox"/> Menu driven | <input type="checkbox"/> Plain English programs | <input type="checkbox"/> Single & multi-user |
| <input type="checkbox"/> No Syntax errors | <input type="checkbox"/> File & record locking | <input type="checkbox"/> Complete DBMS |
| <input type="checkbox"/> Automatic program generation | <input type="checkbox"/> Runs under CP/M, MS/DOS, Turbo-DOS, n/Star, McNOS, DPC/OS families | <input type="checkbox"/> Unlimited No. of Data Files |
| <input type="checkbox"/> Compiled code | | <input type="checkbox"/> Max. Records 16 million |



compsoft
Computers, Software, Service & Support.

INTRODUCING IBM Compatible Hi-Res Monitors from **QUBIE'**

The HR 39 and HR 134 Monochrome Monitors are direct replacements for the IBM Model 5151 Monochrome Display. The HR 39 features a GREEN phosphor screen, while the HR 134 an AMBER screen. Both monitors plug into the IBM Monochrome Display and Printer Adaptor (or compatible) card.

The HR31 200 Colour Monitor is a direct replacement for the IBM Colour Display. It plugs into the IBM Colour/Graphics Adaptor (or compatible) card. The HR31 200 features **0.31mm dot pitch and a black matrix picture tube**. This special tube reduces glare and enhances RGB colour to ensure superb picture quality.

All three monitors include a tilt and swivel base. Use your Qubie' monitor as you would the IBM, it will in no way affect the normal use or function of your Personal Computer.

Technical Data - HR31 200

CRT Size:	14" Diagonal (34cm)
Tube:	Black Matrix
Sync-H. Scan Frequency:	15.7kHz
V. Scan Frequency:	60Hz
Signal Type:	RGB I: TTL Level Positive Sync H/V: TTL Level Positive
Display Size (H x V):	245mm x 170mm
Retrace Time (H x V):	0.5Ms x 0.4msec
Resolution:	640 x 200 lines
Input Terminals:	9 pin "D" type connector
Dimensions:	11"(H) x 15"(W) x 13"(D)
Shipping Weight:	266(H) x 367(W) x 318(D)mm 15.9kg



Model HR31 200



Models HR 39 & HR 134

Technical Data - HR 39 & HR 134

CRT Size:	12" Diagonal (29cm)
Phosphor:	HR 39 (Green); HR 134 (Amber)
Sync-H. Scan Frequency:	18.432kHz
V. Scan Frequency:	50/60Hz
Signal Input:	Video - TTL Level Positive Sync. H - TTL Level Positive Sync. V - TTL Level Negative
Video Response:	20MHz
Display Size (H x V):	203mm x 135mm
Display Time (H x V):	44Ms x 18.99msec
Resolution:	Centre 1,000 lines Corner 800 lines
Display Formats:	9 x 14 matrix, 2000 characters in 80 x 25 format
Input Terminals:	9 pin "D" type connector
Dimensions:	10.5"(H) x 15"(W) x 12"(D)
Shipping Weight:	257(H) x 367(W) x 294(D)mm 11.36kg

All models: 240V AC/50Hz

DEALER ENQUIRIES:

QUBIE'

9/62 Blackshaw Avenue, Mortdale, 2223 - Phone: (02) 579 3322

**America's leading distributor of IBM PC accessories is
now supplying your IBM dealer locally. . .**

Also available: IBM key boards, multifunction memory boards and modems.
IBM is a registered trademark of the International Business Machines Corporation



THE SIXTH AUSTRALIAN
 PERSONAL
 COMPUTER
 SHOW
 CENTREPOINT SYDNEY 12-15 MARCH 1986



Curtain up...

As the doors open on PC86 — The Sixth Australian Personal Computer Show, Richard Rydge previews what you can expect to see on the four action-packed levels of the exhibition.

Imagine hitchhiking to the end of the universe and finding the biggest computer shop imaginable. Imagine hundreds of different computers, peripherals, software packages, and publications to help you do everything you ever wanted a computer to do, and more besides. Imagine dozens and dozens of highly specialised experts with years of experience waiting to serve you, ready to answer your every question. In English. Not in the weird techno-speak of some teenage store assistant.

Through some bizarre time warp, some curious opening in time and space, that colossal computing centre will plonk down in Sydney, next month, for just four days: which is just great if you're interested in knowing anything at all about the latest in the computer industry. It means you don't have to trek the universe seeking out prices, comparing products, trying to fathom complexities that could addle a human mind. You need only stroll along to the Sixth Australian Personal Computer Show — Australia's largest and most comprehensive microcomputer exhibition — and all will be revealed, in full splendor, from March 12 to 15 at Sydney's Centrepoint.

If you can measure an exhibition by the company it keeps then PC86 is in good company.

IBM will be there.

So will Apple, AWA, Commodore, Datronics, Epson, Hewlett-Packard, Imaginering, Memorex, Microsoft, Olivetti, Sperry, Telecom and Texas Instruments, to pluck just a few from over seventy

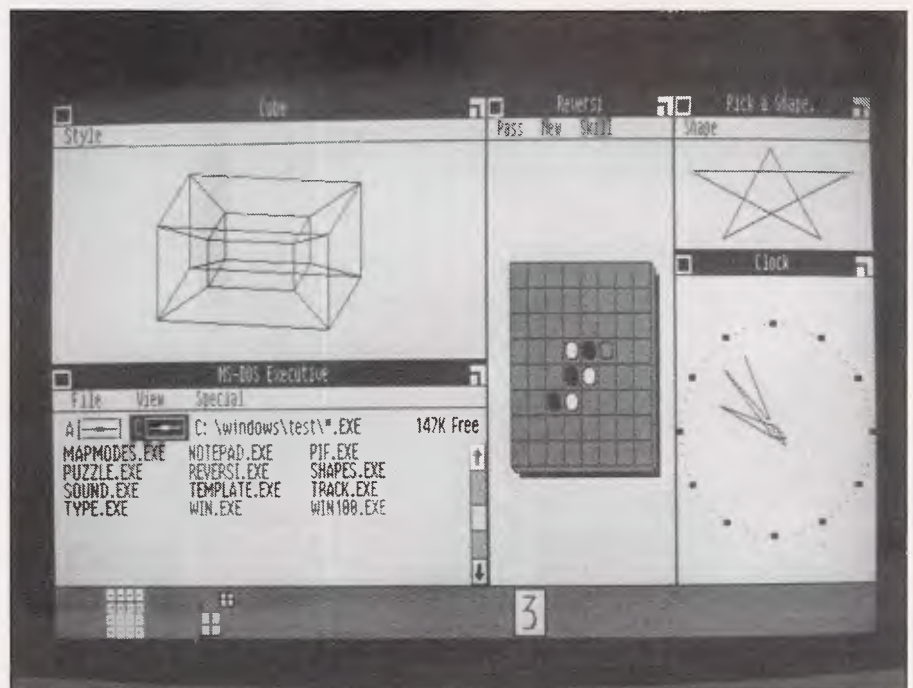
companies in all sectors of the computer industry who will attend.

They are companies that are leaders in their fields, who recognise that PC86 is so important they must be there.

And they're not alone: industry luminaries like the head of Apple Computer, John Sculley, will visit the show; Bill Gates, the software whiz-kid who founded and runs Microsoft, will be there. In fact, the Australian Computer

Society and many of its members will visit there.

The ACS has organised its PC86 Conference to run in parallel to the exhibition. Computer professionals from all around Australia will attend the industry's most important, most comprehensive personal computer conference of the year, keeping time spare especially to visit the Show. In all, more than 25,000 visitors are expected.



Windows, a multi-tasking user-friendly interface for MS-DOS machines, makes its debut at the Sixth Australian Personal Computer Show.



Herbie Briggs has just destroyed the myth that all floppy discs are created equal.

They seem equal. Until you look at the seams.

That's where equality ends.

Most companies seal their discs with a spot here, a spot there. Leaving most of each seam not sealed at all.

Sooner or later, the seams might do what comes naturally: they bulge. Warp. Pucker. Open up.

Pens, pencils, fingernails—even a four-year-old's, like Herbie—can catch and snag in those wide open spaces.

That's sloppy. And dangerous. Because if you put a sloppy floppy into your disc drive, it can jam your drive. Ruin your drive head. Lose your data.

So much for their seams. Ours are different.

THE SLOPPY FLOPPY:

Sealed with a spot here, a spot there. Leaving unsealed seams everywhere.



Memorex uses a process we developed, called Solid-Seam Bonding.

Solid-Seam Bonding seals shut every inch of every seam of every Memorex® floppy disc. Tight as a drum. That makes the Memorex

floppy stiffer. Stronger. And your data safer.

To resist bulging, warping, puckering, or opening up.

MEMOREX SOLID-SEAM BONDING:

Every inch of every seam is sealed shut. Tight as a drum.



To resist all the things that can jam your drive, ruin your drive head, or lose your data.

Which proves that a Memorex floppy disc isn't equal to all the others. It's better.

Solid-Seam Bonding is just one example of the extra care that goes into every Memorex floppy disc. Be it 8", 5¼" or the new 3½". Extra care that lets us guarantee every Memorex disc to be 100% error-free.

The next time you're buying a floppy disc—or a few hundred of them—just remember this:

It's always better to be safe than sloppy.

For more information on the full line of Memorex quality computer media products, including computer tape, call Sydney (02)908 2211 or Melbourne (03) 267 2955



Your Data. When it matters, make it Memorex.™

MEMOREX

There are many reasons for the enormous success of the Show.

One is that it makes learning about computers so easy. It's easy to gain hands-on experience. Whether you're interested in a computer, a software program, a peripheral, or one of the many exciting products that imaginative minds are creating for computers, you have the great advantage of actually being able to see it, to touch it, to use it.

It's easy to find what you need. There is a special Applications Directory available to point the way to solving your business problems. It will guide you through the labyrinth of exhibitors right to the one that has the solution you're seeking.

It's easy because every visitor is given a copy of the Show catalog, free. In fact, readers of this publication can study it before attending the exhibition, as it will accompany, free of charge, next month's NSW copies of *APC*. Not only does it contain the helpful Applications Directory, but also a complete list of exhibitors, their products and full address details so that you can follow up enquiries later.

It's easy because there's advice, real

advice, from experts. And it's gratis, too.

But most of all it's easy because of an enormous range of solutions: four whole floors of them, everything from the latest personal computers, to software, peripherals, communications equipment, micrographics, and word processing.

Commodore will launch its revolutionary Amiga (Benchtested *APC*, August '85) computer at the Show. Even before its release, the industry has become greatly excited by this machine, with its huge processing power, sensational graphics, and synthesised sound. It's being tipped to sell for between \$2,500 and \$3,000, and it's sure to have enthusiasts hovering around it like moths about a flame.

Hewlett-Packard's latest wunderkind, the Vectra PC (Benchtested *APC*, December '85), will be there. It's created quite a few murmurs. The machine runs MS-DOS, has eight expansion slots, and features a massive keyboard that can be used with a touch screen and mouse.

The new IBM JX (Benchtested *APC*, October '85), which is especially aimed



Bill Gates, Chairman of Microsoft (and a very rich young man), returns to Australia to speak at the PC86 Conference. He'll probably be very pleased 'Windows' made it here before him.



IBM's JX in its intended typical environment: the school. No doubt a significant number will also find their way into small businesses with the availability of Lotus 1-2-3 for the machine. See it at the Show.

at educational and small business users, will be on show with a team from IBM to explain its capabilities. With already over 100 applications programs available, a host of hardware options, and the magic letters IBM stamped on it, it's understandable why this machine should prove popular with visitors.

Telecom will be there showing the way of the next century's communications. Viatel, Telememo, and electronic mail boxes are just three of the ways already available to speed and extend communications using a PC.

The list of exhibitors and their products is so huge it would take ages to read about it. And it would take eons to see them all if it weren't for PC86.

It's a rare chance to get an up-to-the-minute overview of one of the world's most competitive, fastest changing industries.

Whatever you do, don't miss it. Even if you have to hitchhike.

Send this page to us now and we'll send you over 35,000 PC buyers next June.

Fold here

Big time PC buyers. Professional business people seriously interested in what you have to offer.

Australian Exhibition Services' highly acclaimed PC Shows have a reputation for attracting over 25,000 of these people every year.

And next year, our numbers will be way up. Because for the first time, the PC86 Show will join forces with two other major exhibitions – Communications 86 and Office Technology 86 – making it the biggest business technology show ever staged in Australia.

And the biggest marketing coup you'll stage in '86.

Obviously, space is at a premium. So secure your top position now. Send us this page and we'll send you colour brochures outlining space rates and details of services provided. Your name on this coupon does not represent a commitment of any kind on your part.

Fold here

Send to: Australian Exhibition Services Pty Ltd Suite 3.3 Illoura Plaza
424 St Kilda Road Melbourne Victoria 3004
Telex AA39329 Telephone (03) 267 4500

THE SEVENTH AUSTRALIAN
PERSONAL
COMPUTER
SHOW

ROYAL EXHIBITION BUILDING



MELBOURNE 1-4 JUNE 1986

Please print in block capitals:

Company

Address

Postcode

Contact

Title

Telephone

Telex

General description of products to be exhibited

IN CONJUNCTION WITH COMMUNICATIONS 86 AND OFFICE TECHNOLOGY 86

AES 666



SCREENTEST

MacLion

Claimed to be a truly relational database, MacLion boasts some powerful features. But is it easy to use? Kathy Lang has her reservations.

An increasing number of packages aimed at the business market are now appearing on Apple's Macintosh (from now on, 'Mac'). In the data management sector, the major contenders include Helix, Microsoft's File, Omnis 3, Lotus's Jazz (whose data management features I hope to look at shortly) and this month's package, MacLion.

MacLion is typical of a relatively new but promising approach to developing packages which can grow with the user. Usually you have to choose between buying a program which is very easy to use but not very powerful, and one which offers stacks of functionality but is correspondingly complex.

This newer breed of packages allows you to begin by using the package in a simple way, with menus and lots of prompting. Once you have exhausted the possibilities of the limited level of functionality afforded in this way, you can progress to using more powerful facilities which, while they are also more difficult to use, develop from the simple features with which you are already familiar. The success of this approach depends very much on the extent to which it is possible to make the early stages simple, and yet provide a steady upward path to using the more powerful features. In my view, MacLion only partly succeeds in this attempt, although in the process it provides a range of features as powerful as any on the market.

The basic record format used by MacLion allows up to 25 fields, any one of which may be up to 255 characters, with each field being stored in the space it actually needs rather than the maximum possible. The total defined length

of a record is limited to 255 characters, so you could use the package for applications with some variable text information — provided the fields were not too long. Sets of records (called 'relations' in MacLion) can be connected together through key fields, with no overall limit on these connections — which to a great extent mitigates the limitation to 25 fields per record in any one relation, though not the limit of 255 characters per record.

'I certainly did not find MacLion easy to use. Even at the straightforward level, it can be tedious to carry out basic tasks. Beyond that level, MacLion is quite complex.'

To regular readers, the introduction of the term relation will immediately set bells ringing — and rightly so. For MacLion is billed as a truly relational database, and certainly it has the basic attributes to justify that claim. Sets of records — relations — can be thought of as tables, with connections between tables allowed via the key in any way, not simply through, say, a hierarchy or records. This permits the linking of two sets of records in which every record in the first set has a matching record in the second (one-to-one relationship), and also linking, in which every record in the first set has one or more matching

records in the second set (one-to-many relationship), in any pattern, provided the link field is a key to the second or target set of records. For example, a client file could be related to an order file, which could in turn be related to a stock file for automatic updating when orders are processed. Keys in MacLion must be unique, though a key may be constructed from several fields to achieve this.

Thus far, for those who like to know these things, MacLion would seem to enforce Codd's Second Normal Form; for those to whom that sounds like gibberish, it just means that MacLion makes it difficult for you to have inconsistent data, such as recording two stock parts with the same code, or entering an order for a non-existent customer.

MacLion provides three levels of processing information, each of which is accessible to the user. Firstly, MacLion can be used entirely through menus, of the usual Mac pull-down type, with options activated through the mouse. At this limited level, you could not sensibly exploit information contained in several linked relations, but only extract results from relations which could stand alone. In this mode, MacLion takes instructions from the use of menus and generates a source program in the Leo language which forms part of the package. This language has all the power of a conventional programming language such as Basic, though some of its features, especially the extensive use of the stack, are closer to languages like Forth.

Secondly, programs generated in this way can be adapted by the user before compilation, to give a limited means of tailoring applications.

VIATEL®

For your Commodore 64

Products
to suit
Apple and IBM
available in
March 1986



See page
96 for
Coupon

The MICROTEX 666 Videotex Package

Expand the horizons of your micro. These packages provide all you need to access Viatel and Microtex 666.

By now you've all heard about Viatel – the exciting new way to do everything from your own banking and shopping to software purchases and electronic mail, plus a vast store of information from share prices to airline timetables. And here's how to gain access via your own micro.

The Microtex 666 package provides:

* **MODEM.** Reliable, error-free communication with top quality modem. Videotex access at 1200/75 and 300/300 for bulletin boards and other data bases. Complete with push button handset (use as second phone).

* **VIDEOTECH COMMUNICATIONS SOFTWARE.** In order to decode the Viatel transmissions and display graphics. This software turns your micro into a powerful Viatel terminal and permits storage of screens on disc for later reference, hardcopy printing and easy auto log-on of Viatel identity.

* **AUSTRALIAN MANUFACTURED.** All components designed and manufactured in Australia for compatibility with Viatel.



* **FULL INSTRUCTION BOOKLET.** As easy as making a phone call. Comprehensive manual and simple on-screen instructions allow easy Viatel access.

Viatel is a registered trademark of Telecom Australia.
Commodore 64 is a registered trademark of Commodore Business Machines Inc.

* **TELESOFTWARE DOWNLOAD.** A vast software library only a phone call away. Download programs from Microtex 666 when you need them and store permanently. Telesoftware download facility guaranteed compatible with Microtex 666 and conforms to Telecom's Viatel Telesoftware specifications.

* **MICROTEX 666 SUBSCRIPTION.** Nothing more to pay... your package includes a year's subscription, normally priced at \$49.95. Microtex 666 – the Service Provider on Viatel dedicated entirely to micro enthusiasts. Choose from hundreds of programs from the Telesoftware library.

* **Disc or Tape Software** * **Modem connects directly to user port** * **Text print facility**
* **User defined command keys** * **Access to Club 64 – \$100 of Free software.**

Save time. Phone instead.

To order or for more information simply phone
Information Solutions (03) 419 0300.

Dealer enquiries welcomed
Australian Personal Computer Page 55

The third possibility is to program your application completely from scratch in Leo, using the ability to execute interpretatively while testing and then to generate a compiled version for final use; for system developers who want to sell their products, there is a run-time only version of MacLion containing all that is necessary to execute compiled Leo programs.

MacLion is produced by a Californian company called Computer Software Design Inc, and distributed in Australia by Imagineering. It is copy-protected: normally you work with a copy of the system disk, but MacLion asks for the original to be loaded once in each session. No duplicate system disk is provided.

Constraints

The main limitations and features of MacLion are shown in Fig 1. The major constraint must be the limit to 255 characters per record. Data types provided are character, real and integer numbers, and date: when using Leo, you can have arrays of variables of any type. No special time variable type is provided, but calculation facilities are good, so it would not be difficult to process times yourself.

File creation and indexing

For each database, MacLion keeps a set

of field definitions which are then allocated to one or more relations. The first step, therefore, in setting up an application is to define the fields you need by entering the name, an abbreviation which is used when setting up screens, the field type and length. The next step is to set up the relations between these fields. Each relation must have a unique key, which may consist of several fields, with a maximum of 27 characters all told. When relations have been set up, you can add records or view them through the Query facility, or by designing screen displays to show one or more records per screen. Field and relation definitions may be modified after creation, and MacLion will adjust the data to match — but it is your responsibility to ensure that you do not lose data in the process.

In addition to the key, which is used for direct retrieval when updating, and for linking relations, you can set up indexes to permit display in alternative orders. Indexes appear only to alter the order of retrieval, *not* (except when browsing in the indexed order) to speed it up.

Data input and updating

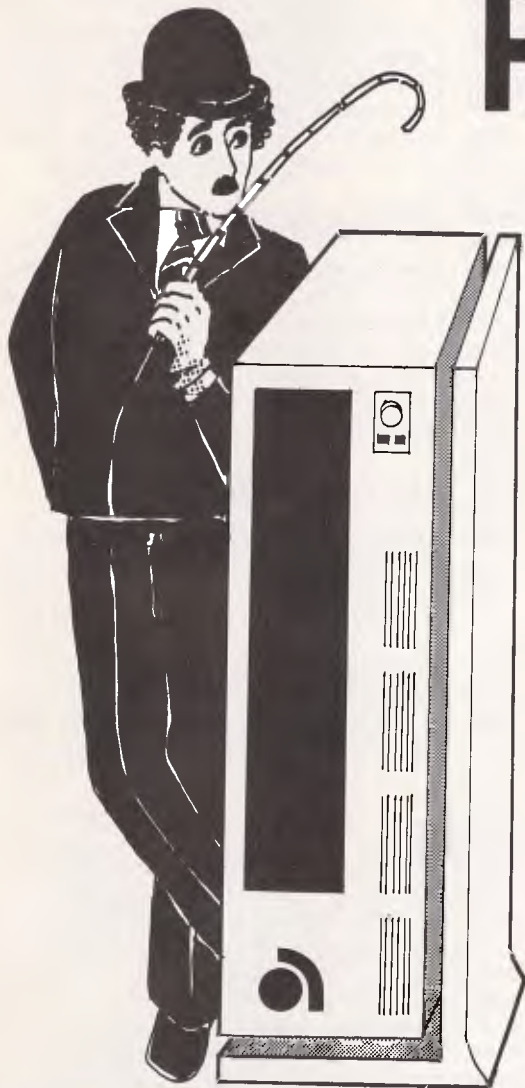
Using the basic MacLion facilities, you can retrieve records by key, either in Query mode or using your own screen designs, and modify them as necessary. If you enter a non-existent key when in Edit mode, MacLion assumes you want to create a new record; if the record already exists, you get the option to edit it. Browsing and viewing of records are well integrated, using either Query or customised screens; the distinctions are more between mode of display and complexity of processing in Query and Screen modes. In either mode, validation criteria are applied on the basis of field information set up in the define phase — you can have mandatory fields, check that a field lies between ranges of values, and so on.

MacLion's Query mode allows you only to add to or update one relation at a time; in Screen mode, you can update two relations using the same screen, one of which is the primary relation (such as a customer's details, the order number, and so on), and the other the secondary relation (such as the details of an order). Fig 4 shows an example of an order entry screen, with the primary relation details on the top, and a set of records from the secondary relation in the lower half. The panels along the top are instructions, which can be activated by clicking on them with the mouse. In either mode, you can recall records for editing either through the key, or by choosing records

Maximum file size	Disk capacity
Max record size (ch)	255
Max no fields	25
Max field size	255
Max digits	15
Max prime key length	27
Special disk format?	No
File size fixed?	No
Link to ASCII files?	No
Data types	Numeric (incl. decimal point), Character, Date, Integer
Fixed rec structure?	Yes
Fixed record length stored?	No
Amend rec structure?	Yes
Link data files?	Yes
No data files open	2/unlimited
No sort fields	unlimited
No keys	1
Max key length (chars, fields)	27,13
Subsidiary indexes kept up-to-date?	Yes, automatically
Data validation	Good
Screen formatting	Default format supplied Paint-a-screen
Unique keys	One is mandatory
Report formatting	As per 'Screen formatting'
Store calculated data	On input, or updating in batch; While editing interactively; Batch process to change specified fields/records
Totals & statistics	Yes
Store selectn criteria	Permitted but not mandatory
Combining criteria	AND (must pass all tests), OR (may pass any one test)
>1 criterion/field?	Yes
Wild code selection?	Yes — field must start with specified character(s)
Browsing methods	Any field for viewing or editing
Interaction methods	Menus, Full tailoring
Reference Manual+	*
Tutorial Guide+	**
Reference Card+	***
On Line Help+	**
Hot-line?	N

Fig 1 Features and constraints

PC's & MINIS ARE DEAD!



Psst!...

...Dealers
...OEMs
...Software Houses
...DP Managers

First there was the standalone PC or the expensive and inflexible minicomputer, then came the first local area networks (LANs). Now, they are obsolete, superseded by technology, inefficient combinations & outdated prices. Its no wonder a lot of dealers, OEMS, and software houses are going to the wall in this competitive and fast moving industry.

But yes, we do have a solution. With the new Archives MicroFive multi-user system you get real super minicomputer multi-user performance at a fraction of the cost and size. And, you can retain all of your IBM compatible PC application software and plug in peripheral cards. You can also select from an extensive range of the best and most flexible locally-developed multi-user business software for a wide range of vertical markets. The extensive range of software and hardware solutions are unlimited.

They say, the ladder to success is never crowded at the top. Maybe that's why some of the most successful dealers and OEMs have endorsed the MicroFive as being the future in todays progressive industry.

The choice is yours...obsolescence or future technology which is here now and will be the market leader in this country over the next two years. Call us today. Your future depends on it.

 **archives**

Preferred Supplier to the Federal Government

• Melbourne (03) 699 8377
• Sydney (02) 922 3188
• Canberra (062) 476 555

The Multiuser Specialists

BM1	Time to add one new record	Inst
BM2	Time to select record by primary key	Inst
BM3	Time to select record by secondary key	NT
BM4	Time to access 20 records from 1000 sequentially on three-character field (same field as in BM2 key)	4mins+
BM5	Time to access record using wild code	3mins 35secs
BM6	Time to index 1000 records on three-character field	30mins 15secs
BM7	Time to sort 1000 records on five-character field	NA
BM8	Time to calculate on one field per record and store result in record	25mins 50secs
BM9	Time to total three fields over 1000 records	5mins 50secs
BM10	Time to add one new field to each of 1000 records	48mins 35secs
	Time to import a file of 1000 records:	2hrs 35secs

Notes: NT = Not tested NP = Not Possible+ = including scrolling.
Where two times are given, first is access to first record, second is access to each subsequent record.

Fig 2 Benchmark times recorded on :Mac/F

using selection criteria which can test on any field.

Screen display

When viewing in Query mode, MacLion displays records across the screen on one or more lines, depending on how many fields have been requested, in a columnar fashion with the field name at the top of each column (see Fig 5). When adding or editing in Query, fields are displayed one on each line, prefaced with the field name (as shown in Fig 6). This format would be inadequate for all but the simplest changes, and for this you would use the screen formatting facilities to set up your own screens. Fig 7 shows a partially constructed screen design, with the pull-down menu used to position fields and captions.

Once a screen has been defined, it must be generated into a Leo source program before being compiled; it is then ready for execution.

Printed reports

The output of a Query list may be sent to the printer, or you can design your own custom-built reports in a similar manner to the design of custom screens. Calculated fields and totals can be included, as well as up to three levels of sub-total, within the basic report generator, together with the ability to include page-breaks, headers, and so on. No specific provision is made for generating personalised letters. Once a report has been designed, it must be generated — that is, MacLion must write the Leo program necessary to carry out the report. The resulting program can be edited before compilation just like a user-written program, so you can get your reports as close as possible to the desired result, and then tweak it using Leo.

Selection and sorting

Within the Query facility, you can select records either by testing a literal value against a key field, or by building up extensive tests using any field and both literals and field values — in that case, the records are searched sequentially. Up to four fields can be requested by name, or you can have all those from a single relation; totals can be requested. Records can be selected, using a WHERE clause, on the basis of criteria which can include the usual range of comparison operators (equals, not equals, less than, and so on), and tests can be combined with AND or OR. You may not use brackets to control the order of evaluation of tests, so some selections would be impossible to make. No 'wild card' options are provided.

There are two ways to set up a query: you can get MacLion to construct the query for you, clause by clause, and end with a result such as that shown in Fig 8. In this case, all the fields must come from a single relation. (The result of executing

this query on MacLion's demonstration database is shown in Fig 5.) The WHERE clause is always entered directly from the keyboard, but otherwise MacLion does the hard work for you.

The alternative is to set up your own queries directly, when you can use fields from more than one relation, provided you have established the necessary key field links. MacLion provides a simple editor to help in constructing queries. Whichever method you use, queries can be saved for subsequent execution. These query requests are interpreted, so may be slower than producing a report using selection criteria since reports are compiled.

Any relation may be indexed on any field or fields, and indexes are kept up-to-date. These indexes are used to dictate the order in which records are displayed or printed, thus providing the facility more usually provided by sorting. Indexing is usually quicker than sorting.

Calculation

Any numeric field can be calculated on input, and included in calculations in reports; totals and sub-totals can also be produced, all via the basic menu-driven MacLion facilities. For the more adventurous, Leo provides full programming of calculations.

Multiple files

Relations can be linked to one another, via the key field in the target relation. Two relations can be updated during a single screen process; in reports, you can connect more than two relations. These facilities are enhanced by Leo features, which give you as much control as a conventional programming language, with (for most people) less expenditure of effort.

Package	Cost	Summary
File	\$365	Data management system designed to make good use of special Mac features, so very visual approach. Provides good basic data management features for single-file, fixed format records, stored as variable length. Links to Word, Chart and MultiPlan.
MacLion	\$565	Powerful relational system for Mac, using icons, menus and mouse and allowing system developers to use them through complex Leo programming language. Simple to use at basic level. Most suited to compact records holding mostly numeric data or dates.
Omnis 3	\$730	Powerful multi-file package for a range of computers, including a special Mac version tailored to allow system developers to take advantage of Mac features. Remarkably easy to use for such a powerful system.

Fig 3 Comparison of similar data management packages

ROD IRVING ELECTRONICS

for peripherals at low prices!



SUPERB KAITEC
180 C.P.S. PRINTER
Epson FX80 compatible standard
80 column dot matrix. Near Letter
Quality mode, and 3K buffer!
Cat. C20020 **Only \$499**



NEW! TTL MONITORS
Fantastic resolution! Enjoy a crisp,
sharp image with these new Ritron
TTL monitors! IBM compatible,
green display, swivel and tilt base.
Cat. X14510 **\$265**



APPLE COMPATIBLE
CARDS!
PRINTER CARD
"Grappier" style card allows hi-
resolution screen dumps to your
Epson compatible printers. Fully
functioned for flexible flow of output.
Cat. X17029 **\$89**



APPLE* COMPATIBLE
SLIMLINE DISK DRIVE
Japanese Chinon mechanism,
compatible with 2E and 2 plus.
Cat. X19901 **Normally \$225**
NOW \$195
(*Apple is a registered trade mark.)



IBM* COMPATIBLES
from \$1,175!
Incredible deals to suit everyone
including our special package
deals!



5 1/4" FLOPPY DISK
SPECIALS!

XIDEX S/D/D	1-9	10+
Cat. C12401	\$31.00	\$29.00
D/S/D	\$38.95	\$36.50
Cat. C12410		
VERBATIM DATALIFE S/D/D	\$27.95	\$26.95
Cat. C12501		
D/S/D	\$39.95	\$37.95
Cat. C12504		
VERBATIM VALULIFE S/D/D	\$24.95	\$22.95
Cat. C12421		
D/S/D	\$31.95	\$29.95
Cat. C12425		

3 1/2" DISK SPECIALS
Verbatim S/S Cat. C12372 **\$75**
Xidex S/S Cat. C12600 **\$65**
Xidex D/S Cat. C12602 **\$89**



COMPUTER PAPER
Top quality at a very affordable price!
Blank 11 x 9 1/2", 2,000 sheet,
quality 80 gsm bond paper.
Cat. C21001 **\$34.50**



RITRON 2
Stylish swivel base monitor,
available in amber or green.
Green Cat. X14500 **\$215**
Amber Cat. X14500 **\$219**

80 COLUMN CARD
Ideal for use with CP/M. Your
computer becomes capable of
upper and lower case, with a full
width screen of 80 characters. If you
want to run Wordstar, or any good
wordprocessing software, get this
card.
Cat. X17019 **\$85**



20 MBYTE HARD DISK
DRIVE FOR IBM AND
COMPATIBLES
Includes disk controller card.
Cat. X20010 **\$1,550**



RS232 DATA SWITCH
WITH TESTER

- 25 pin RS232 "D" connectors 2 in. 1 out or 1 in, 2 out.
- Ideal for 2 computers to one peripheral or 1 computer to 2 peripherals.
- No power required.
- Six dual coloured LED indicators showing certain flow status: T.D. Transmit Data R.D. Receive Data R.T.S. Request To Send C.T.S. Clear To Send D.S.R. Data Set Ready D.T.R. Data Terminal Ready
- Housed in heavy duty metal cabinet.
- Size: 200(W)x68(H)x150(D)mm
- Cat. A00000 **\$149**

COMPUTER LEADS
We have a wide range of computer
leads available, all at very
reasonable prices!

APPLE:

- Apple II, Iie, II+, with parallel interface card
- Dual 10 pin (20 contacts) connector to Centronics 36 pin plug
- Length 2.4 metres
- Cat. P19025 **\$24.95**

IBM

- IBM PC, XT, and look alikes with 25 pin "D" plug on computer end to Centronics 36 pin plug on printer end.
- Length 2.1 metres
- Cat. P19029 **\$34.95**

TANDY

- For models 11/12/16/18B/2000, with dual 17 pin female on computer end to Centronics 36 pin plug on printer end. (Equivalent to 26-1323)
- Length 2.4 metres
- Cat. P19027 **\$29.95**

- For models 11/111/4/4P, with 34 pin edge connector on computer end to Centronics 36 pin plug on the printer end. (Equivalent to 26-1401)
- Length 2.4 metres
- Cat. P19028 **\$32.50**



RITRON 1
Dur most popular model in a steel
cabinet to minimise R.F.I.
Green Cat. X14500 Save \$30 **\$169**
Amber Cat X14502 Save \$30 **\$179**

P.A.L. COLOUR CARD
Get some colour into your games.
Use your Apple or compatible on the
second television. Has both UHF
and composite video outputs. Fully
adjustable so you can fine tune it for
a crisp clean image.
Cat. X17025 **\$95**

SUPER SERIAL CARD
No card does it better. Want to hook
in to bulletin boards or mainframes?
Turn your computer into a dumb
terminal. That's right! This serial
card comes complete with software.
Cat. X17035 **\$129**

SPEECH CARD
Simple to use, software controlled
speech synthesiser kit. Complete
with demonstration programs and
text to speech software. Impress
your friends with your talking Apple!
Cat. X17009 **\$69**

MUSIC CARD
Three channel synthesiser can
create a single polyphonic output or
three monophonic outputs. Control
of pitch and volume is possible. Up
to three cards can be used at the
one time. Complete with demonstration
software.
Cat. X17011 **\$99**



PRINTER RIBBONS
CP80, BX80, DP80, BX100, MB100
\$9.90



"IBM AT STYLE"
COMPUTER CASING
Our latest computer casing, featuring
security key switch, 8 slots, and
mounting accessories etc.
Dimensions: 490(W)x145(H)x400(D)
Cat. X11091 **\$139**



APPLE JOYSTICKS
Ideal for games or word processing.
Fits most 6502 "compatible"
computers.
Cat. C14200 **\$29.95**



IBM COMPATIBLE CARDS
NEW MOTHER BOARDS!
XT compatible mother boards,
8 slots, room for 256K RAM
Cat. X18020 **\$295**

GAMES ADAPTOR CARD
Features 2 joystick ports.
Cat. X18019 **\$49**

MULTIFUNCTION CARD
(384K RAM) Parallel, serial and
game port. Plus battery backup clock.
Cat. X18013 **\$329**

DISK CONTROLLER CARD
Controls 2 slimline drives
Cat. X18005 **\$89**

HIGH RESOLUTION
MONOCHROME GRAPHICS CARD
Give your IBM real graphics capability.
Cat. X18007 **\$249**

512K RAM CARD
Including RAM Cat. X18015 **\$299**
Excluding RAM Cat. X18016 **\$129**



RITRON MULTI
PURPOSE MODEM
The RITRON Multi Purpose Modem
has all the features you require...

- CCITT V21 300 Baud Full duplex
- CCITT V23 1200/75
- Bell 103 300 Full duplex
- Bell 202 1200 Half duplex
- Auto answer, auto disconnect.
- Telecom Approval No. C8437/1134
- Cat. X19103 **ONLY \$379**



RS232C NULL MODEM
ADAPTOR

- Male to female connections
- Pins 2 and 3 reversed
- All 25 pins connected
- Cat. X15658 **\$19.95**

1200/75 BAUD RATE/BIT
CONVERTER
For computers not capable of split
baud rates. Buffers characters at
1200 and converts to 75 baud.
Cat. X19105 **\$99**



CICADA 300

- 300 baud
- Provides full 12V bipolar output signal
- Direct connect modem
- Full duplex operation (Phone not included)
- Cat. X19101 **NOW \$179**

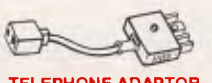


INSIDE CP/M
A Guide for users and programmers
with CP/M-86 and MP/M2, by David
Cortesi.
This book is both a guide and a
reference manual for CP/M, an
operating system for small computers.
The book has two sections. The
Tutorial presents the basics of the
management, use, and programming
of a small computer and CP/M. In the
Reference, CP/M information is
organised for quick access by
programmers and users. **\$47.50**



TELEPHONE CURL CORD

- U.S. plug to U.S. plug
- Replacement hand set cord
- Length 4.5 metres
- Colours: cream, dark brown
- Cat. Y16022 **\$7.95**



TELEPHONE ADAPTOR

- Australian plug to U.S. socket
- Length 10cm
- Cream colour cable
- Cat. Y16026 **\$6.95**



MITSUBISHI DISK
DRIVES
MF353 (3 1/2" DRIVE)
Double sided, double density,
1 M/Byte unformatted, 80 track per
side.
Cat. C11953 **\$280**

MF351
3 1/2" Standard size disk drive.
Single sided, double density.
Cat. C11921 **\$225**

M2896-63
Slimline 8" Disk Drive, Double sided
Density No AC power required. 3ms
track to track, 1.6 Mbytes
unformatted. 77 track side 10s/su10
bit soft error rate.
Cat. C11916 **\$550**

Case & Power Supply to suit
Cat. X11022 **\$159**

M4854
Slimline 5 1/4" disk drive. Double
sided, double density, 96 track/inch,
9621 bit/inch, 1.6Mbyte unformatted
3ms track to track access. 77 track/
side.
Cat. C11904 **\$350**
Case & Power Supply to suit.
Cat. X11011 **\$109**

M4853
Slimline 5 1/4" disk drive, Double
sided, double density, 1 Mbyte
unformatted, 3ms track to track, 80
track/side, 5922 bits/inch.
Cat. C11903 **\$260**

M4851
Slimline 5 1/4" disk drive. Double
sided, double density 500K
unformatted, 40 track/side. Steel
band drive system.
Cat. C11901 **\$199**

Case & Power Supply to suit
Cat. X11011 **\$109**

M4855
Slimline 5 1/4" disk drive, double
sided, double density, 96 track/inch,
2.0 Mbytes unformatted.
Cat. C11905 **\$385**

COMPUTER CHESS!
by SciSys.
SciSys computer chess games
are endorsed by Garry Kasparov,
world's highest rated chess player,
and are available from
Rod Irving Electronics!



TURBO 16K
This brand new chess computer
sets new standards in user
convenience, and beats 92% of all
chess players with its powerful
16K program.
Features:
Instant response
Solves mate in 10 moves
Internal clock with 2 LCD displays
Displays moves considered
Thinks in opponent's time
Takes back
17 Levels
2 Year memory
Mats adaptor socket
Cat. C30010 **\$295**



COMPANION 11
SciSys No. 1 selling full size
computer!
Vary strong chess program.
9 levels with special zero level for
beginners.
Ideal teacher or formidable
opponent.
Turn on/off anytime, one year
memory.
6 months play on 3AA batteries or
optional mains adaptor available.
Take back moves, verify, solve
problems to mate in 4 and beyond.
Player vs. player mode, thinks on
opponent time, built in opening
library and strong end game.
Beginner through club player to
expert. Estimated 1,650 Elo.
Cat. C30004 **\$199**

ROD IRVING ELECTRONICS
425 High Street, NORTHCOTE, 3070
VICTORIA, AUSTRALIA
Phone (03) 489 8856
48 A Beckett St, MELBOURNE, 3000
VICTORIA, AUSTRALIA
Ph. (03) 963 3151
Mail Order and correspondence:
P.O. Box 626, CLAYTON 3168
TELEX: AA 151938

MAIL ORDER HOTLINE
(03) 543 7877
(2 lines)

POSTAGE RATES

\$1-\$9.99	\$2.00
\$10-\$24.99	\$3.00
\$25-\$49.99	\$4.00
\$50-\$99.99	\$5.00
\$100-\$199	\$7.50
\$200-\$499	\$10.00
\$500 plus	\$12.50

This is for basic postage only. Comet
Road freight, bulky and fragile items
will be charged at different rates.
Certified Post for orders over
\$100 included "free!"
Registered Post for orders over
\$200 included "free!"

All sales tax exempt orders and
wholesale inquiries to RITRONICS
WHOLESALE, 55 Fenner Rd., Clayton
Phone (03) 543 2166

Errors and Omissions Excepted

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

KNOWLEDGE
man/2[®]
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

SCREENTEST

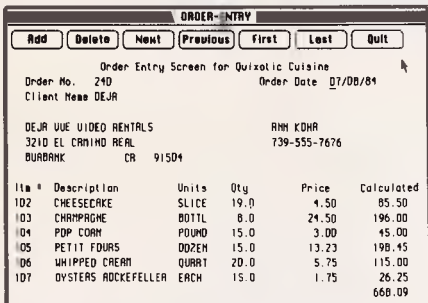


Fig 4 Two-relation entry screen

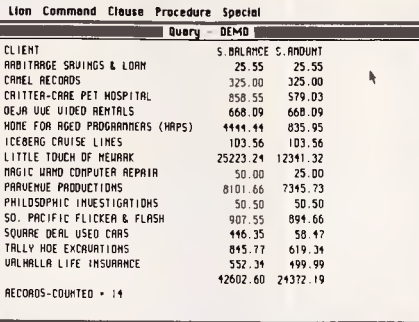


Fig 5 Columnar query output

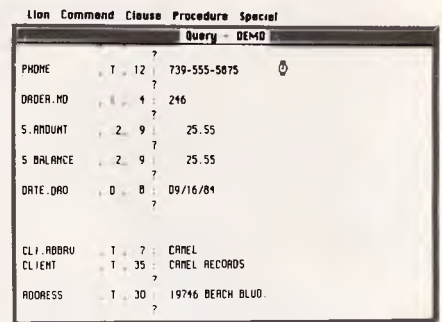


Fig 6 Data entry in query mode

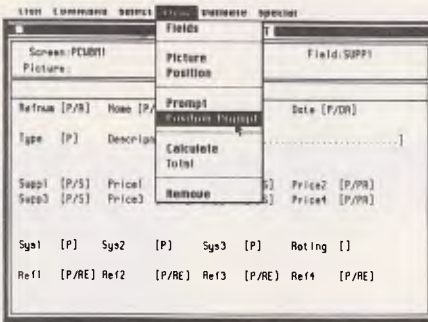


Fig 7 Constructing a data entry screen

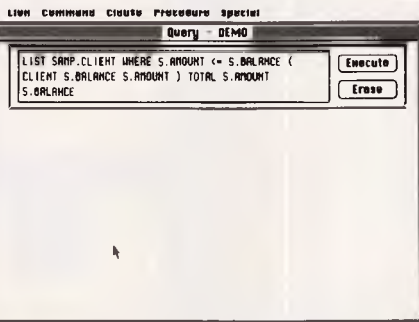


Fig 8 Query request to produce list shown in Fig 5



Fig 9 Field selection in query mode

Tailoring

Mention has already been made of Leo, the MacLion programming language. Leo programs may either be generated directly from screens or reports defined with the help of the interactive design facilities, or may be written from scratch by users. In either case, programs may be amended as appropriate. Leo gives the control one would expect over the system, including direct cursor addressing, and the ability to edit and handle Mac 'buttons' and 'rectangles' — indeed, all you would need to build a special-purpose application. However, Leo is not for the *dilettante* programmer: you have to be prepared to put in some hard work to get used to it and achieve anything more than trivial results.

Summary

Suppliers:	Imagineering
Cost:	\$565
Systems:	Mac
Version Reviewed:	3.0
Type:	N,M
Features:	Relational database for Mac. Can be used at simple level from menus with mouse, or by adapting or writing programs. Limited record size and small screen means best for compact records. Powerful query language, good indexing, well integrated with Mac.
Drawbacks:	Very limited record size, few character string functions.
Ease of use:	Good, if tedious at simple level. Constructing own queries or writing Leo programs is difficult and badly documented.

Housekeeping

You can change drives and disks within MacLion. There is also a special back-up utility to copy your database in a compressed format, and to restore it when needed.

Links with outside

The publicity for MacLion states that it has flexible facilities for linking with the main spreadsheet program, but despite assiduous searching I could find no reference to these features either in the manual or in the pull-down menus. For this reason, I was unable to carry out my usual Benchtest: I hope to do so soon.

User image

At the simplest level, MacLion is an easy package to use because it takes full advantage of the Mac's features, exploiting the pull-down menus, buttons and mouse to the full. At this level, however, a good deal of unnecessary tedium is involved. For example, when designing an input or display screen, the positioning of each field involves eight operations:

- (1) click on the 'Fields' option
- (2) click on the name of the field to be located
- (3) click the 'Prompt' option
- (4) enter the characters for the caption
- (5) click the 'Position-Prompt' option
- (6) move the mouse to the desired position for the caption and click
- (7) click the 'Position' option
- (8) move the mouse to the desired entry position for the field and click

Once beyond this simplest level, other problems begin to emerge. The most glaring, perhaps, is in the Query module, in which the syntax is primitive in the extreme. In the example in Fig 8, the spaces are significant — each operator must be preceded and followed by a space, as must the parentheses which surround the field name list. The use of brackets for this purpose prevents their being used in the WHERE clause, a serious limitation.

Another real irritation is that the order of including the clauses is significant: if you enter the query directly, and put the WHERE clause after the field list, it is



Raise your printing with HP

The HP LaserJet printers are just two of the star performers from the HP family of PC peripherals which are designed to help maximize the potential of your Personal Computer. The LaserJet and LaserJet Plus both offer super fast and quiet operation and incomparable quality at a competitive price.

LaserJet will handle a number of different type styles and sizes all on the one page using optional font cartridges. Plus graphics to create charts, graphs and illustrations. With the LaserJet Plus priced under \$7,800* you get improved speed and graphics as well as extra capabilities such as built-in shading and patterns which are perfect for

LBV 7776 HEP L

enhancing forms and business documents.

Meet the rest of the family.

HP ThinkJet Printer.

A low cost, high quality text and graphics printer that produces professional and easy to read



documents. Perfect for company memos. ThinkJet is extremely quiet and offers a variety of printer interfaces plus an adjustable paper feed mechanism.

HP Portable Plus.

In 1985 the predecessor to Portable Plus won the prestigious "Your Computer" magazine PC of the Year. The Portable Plus now gives you the power of a desktop computer and the convenience of a portable specifically designed to lead as busy a life as you do.

It is remarkably durable and offers all round flexibility that can

**UNDER
\$5,900***

standard in seconds flat LaserJet.

stand alone or perfectly
complement your current Personal
Computer.



**UNDER
\$5,000***

*Recommended retail price includes tax and is subject
to change without notice.

To receive your free Information Kit
or to learn more about these
products through a

Hewlett-Packard Authorized Dealer
just fill in the coupon below or call
HP direct.

Please send me a free information kit on:

- LaserJet Printer Family ThinkJet Printer Portable Plus
 Please arrange for an Authorized Hewlett-Packard Dealer to
contact me to discuss these products further.

Name _____ Company _____

Address _____ Postcode _____

Mail to:
ATTENTION
Christene Okey
Hewlett-Packard Australia Ltd.
31-41 Joseph Street
BLACKBURN, VIC. 3130
Melbourne (03) 895 2895 ext. 2902
Sydney (02) 888 4444 ext. 4711



**HEWLETT
PACKARD**

Canberra (062) 80 4244 Perth (09) 383 2188
Adelaide (08) 272 5911 Brisbane (07) 300 4133

LBV 7776 HEP R/2



simply ignored. The result is a specification which is more limited than the selection mechanism provided by some entirely menu-driven packages, yet it looks distinctly program-like, and might well inhibit less experienced users.

At the most advanced level, Leo provides a powerful programming language, but I certainly did not find it at all easy to get to grips with — although its power in handling Mac features is undoubted.

Documentation

MacLion comes with two manuals, one for tutorial and the other for reference, two reference summary cards — one for the basic system and the other for Leo — and a sample database on disk which is used in the tutorial manual.

Here my prejudices will begin to show. MacLion has the most folksy and irksomely patronising manual I have ever had the misfortune to meet, and the folksiness extends to the system itself. Being told to 'go and pad around in the jungle for a few minutes' may be amusing in a demo, but it drives me bananas when I'm trying to get real work done in a hurry! I could just about cope with that if



SCREENTEST

the manual were otherwise good, but, apart from having one section (spanning the middle of two chapters) bound upside-down and back-to-front, the manual just does not tell what you need to know. For example, the point about the order of query clauses being significant I discovered the hard way — I certainly could find no reference to it in the manual. And many of the examples actually omit spaces which are mandatory in the Query syntax.

A more serious complaint is the lack of any real attempt to put over the basic concepts of the package. The tutorial manual is all 'do this, then this' without any overall picture, while the reference manual dives straight into the depths of detail, again without any model of the system, and also without many details which are embedded in the tutorial manual. The best part was the two

reference summary cards, though even they did not include precise definitions. Finally, onscreen help was OK at the general level, but was very little use in sorting out detailed points in a context-sensitive way.

Conclusion

I had great hopes for MacLion, since it promised to provide powerful features and yet be easy to use.

Powerful features it certainly has, although the limitation to 255 characters per relation is a serious drawback. But powerful features are not much use if they are difficult to exploit, and I certainly did not find MacLion easy to use. Even at the straightforward level, it can be tedious to carry out basic tasks. Beyond that level, MacLion is quite complex. So if you want data management on the Mac, it will pay you to look hard at MacLion — but also at its competitors.

(Subsequent to this test being completed, Version 3.1 of MacLion was released by Imagineering — Ed)

END

The big software package with the small price tag.



Information Business Manager is a complete accounting package suitable for most businesses and compatible with 8 and 16 bit micro computers (all those with CP/M or MSDOS available).

Totally developed in Australia, Information Business Manager performs the following accounting functions

- Accounts Receivable
- Accounts Payable
- Stock Control
- Order Entry/Invoicing
- General Ledger

Available at leading computer outlets
New dealer enquiries welcome

Other programmes also available

- Real Estate System
- Insurance Brokers System
- Payroll
- Software written to your specifications



Information Unlimited
specialists in cost effective business solutions

2 Prospect Hill Road, Camberwell, Vic. 3124
Telephone (03)813 3022 813 3077

AA1003

“Truly a miraculous package”

Computer Language — Feb '85

DeSmet C

The most cost effective Development Package for C in Australia

- Full K&R C Compiler
- Assembler, Linker & Librarian
- Full Screen Editor
- Execution Profiler
- No royalties on generated code
- Fully supported throughout Australia
- Both 8087 and floating point libraries
- Overlays
- First and Second in Aug '83 BYTE benchmarks

only \$195

SYMBOLIC DEBUGGER

- Examine & change variables by name using C expressions
 - Flip between debug and display screen
 - Display C source during execution
 - Set multiple breakpoints by function or line number
- only \$95

DOS LINK SUPPORT

- Uses DOS OBJ Format
 - LINKs with DOS ASM
 - Uses Lattice naming conventions
- only \$70

Also available

TOOLS (\$65)
GRAPHICS (\$65)
UTIL (\$45)
HACKER (\$45)

Contact

The Computer Trader
3 Bowen Cres.,
MELBOURNE 3004
Telephone Orders
(03) 266 1995



AS YOU CAN SEE, COMMODORE IS THE RIGHT BUSINESS DECISION.

In 1984 Commodore shipped more computers world-wide than Apple. More even than IBM*.

Because Commodore computers have been designed to be easy to use. And they've been priced easy to buy.

The new Commodore PC business computer is a perfect example.

It is IBM compatible. Which means it can run the world's most popular business software. Like Lotus 1-2-3.™ Multiplan.™ And Wordstar.®

And because it's from Commodore, you can have this high standard of performance for \$1,999*!

Imagine how much you'd save if you're putting together a computer network.

And when you're dealing with Commodore, you get the full service and support you'd expect from a computer company that outsold

IBM and Apple.

Send this coupon now to get the full picture on Commodore's success story. †Source IDC 1984 shipments

To: National Business Products Manager,
Commodore Computer, 67 Mars Road, LANE COVE NSW 2066

Please send me details of the Commodore PC fast!

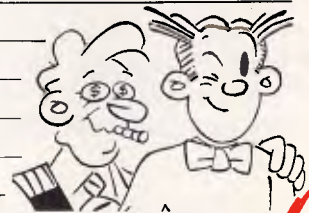
NAME _____

ADDRESS _____

_____ POSTCODE _____

BUSINESS _____

POSITION _____



commodore PC ✓
THE RIGHT BUSINESS DECISION

© Lotus 1-2-3 is a Trade Mark of Lotus Development Corporation.

© Multiplan is a Trade Mark of the Multiplan Corporation.

© Wordstar is a product from Micro Pro®.

Brother. Pioneering information processing.

The Brother name in printers stands for advanced technology, revolutionary new features, design excellence and proven reliability at a reasonable price. Just two machines that meet this criteria are the Brother M1509 and the Twinriter 5 (HR35DD).

Brother Twinriter 5. The world's first Daisy Wheel & Dot Matrix printer.

Brother M1509. High Speed Dot Matrix printer.



Now you can have two printers — Daisy Wheel and Dot Matrix, for the price of one.

- Features:** 140 cps dot matrix type and graphics
- 36 cps letter quality daisy wheel print
 - 3K byte buffer memory (optional 11K or 19K byte)
 - 136 columns
 - 420 cms (16.5 inches) paper width
 - Centronics Interface with optional RS-232C converter
 - Interchangeable daisy wheel cassettes.
- The new Brother Twinriter 5. Two of the best printers money can buy.

This new printer is not only very fast and very quiet, it's also very inexpensive.

- Features:** High Speed output (180cps)
- Near Letter Quality printing (45cps)
 - Big 3K byte buffer memory
 - Dual Interface (Centronics, RS232C)
 - IBM plus Epson Compatibility built-in
 - Optional cut-sheet feeder
 - Compact and lightweight
 - Optional NLQ font board available (LQ-200)
 - High Density Charts and Graphics Printing. Brother M1509 — Value that speaks for itself.

brother[®]
Pioneering Information Processing

7-9 Khartoum Road North Ryde NSW 2113

SYDNEY (02) 887 4344 • MELBOURNE (03) 873 3655 • BRISBANE (07) 52 5257 • ADELAIDE (08) 42 6373 • PERTH (09) 478 1955. 4398APC



David Ahl reflects on the lack-lustre Comdex show and commiserates with Tandy, suffering badly under its old Radio Shack title.

Old hat

Reflecting the general dullness encompassing the entire personal computer industry was the almost total lack of anything innovative at the fall Comdex.

Microsoft announced that it is finally shipping Windows, a product first announced two years ago in the fall of 1983. Windows provides a multi-tasking and graphics operating environment for the IBM PC and clones. It requires 256k of RAM, a graphics adaptor card and two disk drives. Used with MS-DOS 3.0, or higher, or for multi-tasking applications requires a whopping 512k of RAM. Windows comes with basic word processing and 'paint' programs, together with several desk-top utilities. Sold alone it is priced at \$US99. Will it be a success? The price is low enough but how many people will be willing to sacrifice 256k-512k of RAM for a fancy operating system? Perhaps it will help multi-tasking become more commonplace; at this point that's the only reason I can see anyone turning to Windows.

The other major introduction was dBaseIII Plus from Ashton-Tate. Aimed at both single and multi-user environments, the enhanced product allows multiple users to access the same data files without data corruption. Other improvements include the use of pull-down menus, additional programming commands and faster execution speed.

From a trickle a year ago to a flood now, everyone is jumping onto the CD-ROM bandwagon. Although 12in optical laser disks have been around since 1975, the smaller 5in compact disk size has finally attracted manufacturers' interest. I counted five new CD-ROM devices at Comdex from Tecmar, Sony, Reference Technology (Hitachi-made), Panasonic and Philips.

But perhaps most interesting of all was the joint agreement announced between Optimum

and 3M. Optimum will produce a drive which uses 3M's new write-once and eraseable optical disks. It will also be able to read standard read-only disks. Optotech also has a write-once drive which it expects to ship in the first quarter of 1986.

Although the press room seemed to be full of new product announcements, they were mostly of the *ho-hum* variety: new printers, monitors, hard disk drives, adaptor cards, and — just what everyone had been waiting for — five more word processing packages!

Name that tune

Faced with a declining market share and profits as a result of a big 'ho-hum' toward its Model 4, Tandy introduced its Model 2000, a faster, better, and not-quite-compatible IBM PC clone. It should have asked its Texan neighbours, TI, about faster, better and not-quite-compatible machines. Like the TI Pro, the 2000 didn't quite fly.

So, Tandy turned to its big stick — aggressive pricing. The Model 1000, a no-frills PC clone entered the market priced at around \$US1500, a good price a year ago. By the fall of 1985 it was going for under \$US1000, which included a colour monitor and an integrated software package.

Now Tandy has released its Model 3000, an IBM PC/AT-compatible, for just \$US2599 with two floppy drives, and \$US3599 with one 1.2Mbytes floppy drive and one 20Mbytes hard disk drive. That puts it a full 40 per cent under the IBM unit and 15-20 per cent under most other AT clones.

Tandy hopes its name change (it has dropped Radio Shack and the TRS-80 designation from its computer line), a reorganised sales force to concentrate on direct sales, and the offer of multi-user capabilities on the Model 3000 (Microsoft Xenix System 5.0), will help the company make inroads into the Fortune 1000 corporate business market. I'd say it can't hurt, but in my opinion the Radio Shack image is going to hold

the company down for a good deal longer than it might expect.

Domestic strife

Steve Wozniak, inventor of the Apple II, can't seem to ferret out the bugs in the first products of his new company, CL9 (Cloud 9). The company's central product, called IRS (Infra-red Servant), is designed to control every remote-controlled component (TV, video cassette recorder, stereo, and so on) within a household's entertainment centre, regardless of manufacturer. The product was supposed to have been released in time for Christmas at a price below \$US200, but it has been delayed until at least late spring.

Faced with delays in IRS, Wozniak fell back to Plan B, namely introducing Tyron, a \$US20 unit that attaches to existing remote-control devices to increase the sensitivity of their infra-red 'eyes'. But now even Tyron has been delayed until the spring.

The CL9's delays may be its undoing. General Electric has started to deliver its Control Centre, a \$US150 device to operate other components, and other such devices priced at under \$US100 are already on the way.

Long-term integration

Although more than 10 integrated software packages were announced in 1984-5, only two of these made it to market in significant quantities: Symphony from Lotus; and Framework from Ashton-Tate. Although the reviewers virtually unanimously liked Framework better than Symphony, the market clearly went to Lotus. Compared with the potential growth of the integrated market sector, however, 1985 was just a small pile.

Analysts do not agree that the growth of the market will be smooth and easy. More experienced users, for example, generally prefer to purchase two or three superior separate packages and perhaps a desk-

top utility rather than integrated packages that may excel in one function but fall short in others.

Thus the appeal of integrated packages is primarily to less sophisticated, occasional users, particularly those with little software experience. However, analysts see most new customers falling into this category, hence there should be a tremendous growth in integrated software in the next few years: indeed, Frost & Sullivan projects that a whopping \$US23 billion will be spent on integrated packages during the next three years.

Random bits

Ken Olsen, president of Digital Equipment Corp, announced that the firm will release a VAX version of MS-DOS; the new machine will not be sold through retail channels... Recognising Borland's success with add-on packs for the PC, IBM will market SideKick and Turbo Pascal. Under the agreement, IBM can add other products at its discretion... Contrary to industry direction, IBM recently raised the prices by eight per cent to 10 per cent on 139 software packages for the PC... In the quarter ended 30 September 1985, computer retail stores increased their purchases of IBM products by 177 per cent, mainly at the expense of Apple whose sales fell by 42 per cent... AT&T is rumoured to be looking at a total automobile information/guidance system using a small computer with a CD to store map images. But by the time its foot-dragging bureaucracy does anything about it, the Japanese will probably own the market... Meanwhile AT&T's Data Communications Products unit (the old Teletype Corp) has added a line of modems, multiplexers and network management devices to its product line of data terminals... Did you miss it? In a low key introduction Microsoft released a new *super-duper* Basic for \$US99.95 — an effort to head off Borland Turbo Basic perhaps?... Xerox has spun off a new company, Astra Corp, to extend Ethernet.

'I think therefore I am?'

The arguments in support of whether or not computers are 'alive' are gaining momentum. Noel Williams adds fuel to the fire.

Geoff Simons argued in the November issue ('New Life', page 68) that computers are, or soon will be, alive. He bases his certainty on a systems description of life which, broadly speaking, says that any system which contains a critical set of subsystems can be thought of as alive, irrespective of the actual constituents of the system. So, the argument goes, if we take the systems view, a life need not be carbon-based. Consequently, if computers can be shown to have those critical subsystems, they may be seen as rudimentary silicon-based life forms. Mr Simons devotes most of his time to establishing that such subsystems exist in silicon systems of one kind or another.

It is an interesting point of view but, if wrong, it might also be a highly dangerous one. Suppose there is something essential to carbon-based systems which means that only they can really be alive. This something might be 'sentience', or 'mind', or 'soul', or 'spirit', or some other form of subjectivity, but it might equally be something chemical or electrochemical. If this were so and we attributed life to silicon systems, we might be led into all kinds of ethical and practical problems which at best would waste a great deal of intellectual effort and at worst could cause human beings (and other carbon-based life) discomfort, devaluation and death. If people commit suicide because they cannot face the loneliness of Darwinian man, how much worse will they feel if they believe they

are a second-rate life form, doomed to be the toys of microchip masters?

Critical difference

The difference between regarding computers as simulating life and regarding computers as being alive may be a small one, but it also might be a critical one. Mr Simons clouds this distinction somewhat, but he is not really to be blamed as the (in)famous Turing test and the notion of functional equivalence (whereby if two systems do the same things, they are regarded as equivalent systems) have done much in Artificial Intelligence and computing science to promote such haziness. But it should be clear that a system of one kind, call it A, using functions of a kind A to achieve goals of a kind A, is very different from another system whose function is kind B, the simulation of the goals and functions of system A.

We might ask, first of all, if we had a computer (let's call it HAL) which simulates all the functions of a living organism, such as an amoeba, whether or not it is alive. According to the systems definition, it must possess all the subsystems required for life because it must simulate all the amoeba's subsystems. Does this make it alive?

If you say 'Yes, it must be alive', then what would be the situation for a computer which simulated HAL simulating the amoeba? Or a computer simulating a computer simulating HAL simulating an





Think about it another way. Geoff Simons argues that computers have all the subsystems necessary for life. They ingest energy, process it and excrete waste matter. They process information. They move and they reproduce. In all these cases we might retort that these are metaphors. For example, is the heat from a microprocessor 'excreted'? Is a

system processing information if it does not know what that information is (that is, is the operation of a network of transistors actually information processing)? Do computers reproduce? Certainly there are more computers than there used to be, but where is the computer that has created, in its entirety, another computer?

Even if they are not metaphors, are they accounts of real or plausible computers? Take the argument that computers reproduce in symbiotic relationship with people, which seems to have some force. As flowers use bees to reproduce, so computers use humans. But if this is so, aren't Ford Cortinas, Volkswagens and Rolls-Royces alive?

NOW AVAILABLE FOR IBM
PC AT AND COMPATIBLES
SINGLE AND MULTIUSER



Look here dBase *Multilosers* Become a FoxBASE *Multi-user*

FoxBASE is a brand new single and multiuser relational database system. It does everything dBase II does, only faster and better.

FoxBASE is fully compatible with dBASE II source language and data files, extending to full macro usage.

Faster

FoxBASE uses state-of-the-art B+ Tree indexing. Simply rebuild your index files to convert an existing database from dBASE to FoxBASE. The result is a substantially smaller index file typically 50% smaller than dBASE II. Sorting tasks are typically 20 times faster than dBASE.

FoxBASE produces compact object code and makes automatic use of 8087 or 80287 chips to get your applications running up to 40 times faster. Virtual program storage techniques ensures that frequently referenced programs are retained in memory in compiled form.

Because FoxBASE compiles your source code to tokenised code, your applications are secure as well.

FoxBASE additional facilities and features:

- On-line manual/help facilities. Intelligent error checking can even detect tricky "if else end" and "do while end do" mismatches.
- Full type-ahead buffer.
- Up to 48 fields per records as opposed to only 32 in dBASE.
- Twice the number of memory variables as dBASE II.
- Entirely bug-free. FoxBASE has non of the numerous well documented bugs that plague dBASE users.
- More accurate. 14 digit numeric precision. dBASE II provides only 12 digit precision.

Portable

Written in C, FoxBASE is highly portable. Changing to FoxBASE means your software will continue to be usable in future machine and operating system environments.

FoxBASE currently runs MS-DOS/PC-DOS, AOS/VS, UNIX, XENIX, Molecular. Develop your application on a mainframe then run it on a micro – or vis versa.

Multiuser

FoxBASE is the only multiuser DBMS that

is fully compatible with dBASE. You get full file and record locking – essential in a multiuser environment.

Termcap allows FoxBASE to run on virtually any terminal. And with some versions, the record file capacity is extended to 2 billion records.

Economical

For as little as \$20.00 per license, you can distribute FoxBASE with your applications.

Multi-user Versions:

Xenix: \$1295.00, MultiLink: \$1295.00

IBM-PC Net: \$1295.00

Single-user Versions:

MS/PC-DOS: \$695.00, AOS/VS: \$1295.00

CEREBRAL SOLUTIONS

Suite 1, 7th Floor, 8 West Street
Crows Nest 2065 Phone (02) 923 2288

**For further information phone
today or write to:**

FoxBASE, PO Box 741, North Sydney 2060.

Because, in symbiotic relationship with man, they process information, they process energy, they move in response to their environment and they have reproduced, multiplied and evolved.

Put it another way. If an entity is alive if it has a given set of subsystems, then you might suppose that wherever you find those subsystems organised together, you find a living entity. If this is not true, then Mr Simons' whole argument falls down. If computers are to be regarded as alive by Mr Simons' argument, then possessing of the life subsystems has to entail possession of life, in which case the living entity in a symbiotic relationship must consist of both partners in the symbiosis. If one partner cannot exist without the other and life is defined as possessing the subsystem provided by the symbiotic partner, then the 'living entity' must be a 'beeflower' or a 'carperson'.

Why is this intuitively silly? Because one of the partners in such a relationship is dominant and controlling while the other is controlled. Otherwise, we might be led to believe that a 'symbiosis' of air and fire is a living entity, as it takes only a small imaginative step to identify all the necessary subsystems in such a 'symbiosis'.

But there is no intention, no motivation and no control in flame or in air. Similarly, a car does not exert any control over its driver, and those features of computers which lead users to believe they are controlled by malign demons are designed and created by human computer scientists and human programmers. The entirety of a computer's performance is determined by human beings. The programmer might not be able to anticipate the results of his program and might not understand what it does when it runs, but it is still a function of the programmer's action, not any intention, motivation or control exerted by the machine itself.

Absurdity

The absurdity of any claim for life for a computer can be seen by examining the nature of a real computer system. When does it exist as a living entity? Is it when it has been designed; or when it has been built, but not tested; or when it has been tested but not used for its 'proper' purpose; or when it is running real software in a real application? Suppose we settle for the latter and regard all the others as (metaphorically?) conception, birth and education of a growing life. Our computer is only properly alive when sitting on the desk churning through its expert system.

What kind of entity is it when switched

off? It cannot be alive, as it no longer possesses any of the crucial subsystems. True it possesses the potential for those subsystems, but that is also true of a human corpse. On the other hand, if it is dead, what happens when we switch it back on? Is it a resurrected corpse? Is it a new entity with a new life?

Perhaps we should think of a computer as dormant or hibernating while it is switched off. This might just be acceptable providing we were happy with regarding an entity that had none of the life functions while sleeping as being alive in some sense. (But then how do we distinguish between a switched-off computer and a collection of components which have never been switched on?)

Suppose we switch our system back on but, instead of running our expert system, we run *Space Evaders*. Is the machine now alive or not? Suppose it is switched on but running no program at all. Is it alive? Surely not. To all intents and purposes it is the same as when switched off. True, it is now operating some subsystems and probably running programs such as polling the keyboard for a keypress, but it is both behaviourally and as a system unalive because it is not changing or moving or doing anything.

If anything is alive, it cannot be the computer at all. Life must exist in a computer *running a particular kind of program*, so it is not the computer that is (or might be) alive but a combination of computer and software. The crucial element is the software: without the software, the machine is nothing. The software requires a machine, but it could be any old machine that will run it, and it will turn such a machine into an apparently living entity. If life somehow resided in the hardware, the metaphor forces us to form the following conclusions about computer life:

- (1) A computer can be sometimes dead and sometimes alive, and sometimes neither one nor the other.
- (2) One computer organism can possess different stages of evolution, different kinds of intelligence and different kinds of life, and can de-evolve.
- (3) There is something intrinsic to an assembled computer, which is different from the sum of its parts, which makes it alive (in some sense), even if it is never switched on.

In other words, a hardware-oriented discussion of computer life soon leads to absurdities, or at least to the need to consider the possibility that an assembled computing machine running no program has a soul (in order to distinguish it from its non-living components).

Life-like

At this point I am prepared to concede that a certain software configuration, run on a machine which can handle all of it (including, perhaps, sensory mechanisms) might *look* like life. Mr Simons' beliefs (rather than his argument) might prove correct. Ultimately, it may be possible that we understand enough about the algorithms of life to be able to program them, always assuming that there are such algorithms; and that Alan Turing's proof that human beings can never understand themselves is flawed; and that we could achieve an understanding of problems which people have never previously made inroads into.

But it may be possible to describe those subsystems completely in such a way that a computer could run the description. Even this would still be a simulation run on a dead machine if the machine were not dedicated to the one set of algorithms, and those algorithms were not built into the circuitry of the machine. Quite possibly, such 'life algorithms' would depend on the electrochemical nature of the chip structure, and it might be that they could only be achieved using biochips. This returns us to square one: it may be that there are intrinsic qualities of certain carbon-based substances which make them the only suitable carriers of the algorithms of life.

If this is the case, we could only call a computer alive if it contained living molecules, which is, of course, a circular definition.

Argument unresolved

The systems approach to defining life, as given by Mr Simons, amounts to no more than word play. If you accept such a definition, computers might fall under it, but so would a host of other entities and systems which few people would want to call alive, and you are led to some peculiar speculations.

It would be much better to concentrate on how computers can improve the quality of human life, and leave computer rights to the computers. After all, if it is true that computers are an emergent lifeform, either they are only alive in the sense that a car, a flame or a virus is alive, in which case we should spend no more time on the matter than we presently do, or if they are a powerful species, the next stage in evolution, that they will soon be able to argue their own case — and human beings surely have nothing to gain by hastening the planet's takeover.

END

Comdex report

Comdex/Fall '85, this year's version of the world's top computer trade show, opened in Las Vegas with fears of an imminent battle for survival. Peter Jackson was there to comment on the highlights.

The Comdex show has traditionally been a launch pad for the following year's machines and software, with US dealers working out what they are going to sell. But this year the excitement was muted, and the tone was set less by glitter and high-tech razzmatazz than by Hewlett-Packard supremo John Young's opening address on 'Surviving the Industry Downturn'.

There were some trends to watch though, and even some machines and peripherals that went around or beyond the IBM industry standard. The highlights are picked out on the following pages.

LEXISOFT

The rash of laser printers launched at the show as accompanied by a range of desk-top publishing software, and a line of complete turnkey systems with combined hardware and software.

Lexisoft launched a desk-top publishing package for the PC, built around its Spellbinder word processor. Designed to drive the Hewlett-Packard LaserJet Plus printer, the package lets users create and edit text, specify fonts and graphics, and view the whole page onscreen before printing.

Windows, boxes and lines can be



drawn, and 16 different fonts are available.

Support for other printers is promised by president John Bintz in the near future. Retail price is \$650. (Peter, naturally, quotes all prices in US dollars).

TANDY

The major hardware launch at the show turned out to be Tandy's AT-lookalike, the 3000, which stood out from the other AT clones thanks to aggressive pricing.

The 3000 starts at \$2599 with the faster 8MHz 80286 processor, 512k RAM and a single 1.2Mbytes floppy drive, going up to \$3599 with the addition of a 20Mbytes hard disk. Monitors are extra; \$199.95 for monochrome and

\$599 for colour. There are 10 expansion slots for AT cards, with eight available spaces in the standard configuration, and standard fittings include a real-time clock and serial and parallel ports.

Operating software is MS-DOS 3.1, including support for Tandy's own ViaNet local area network, or — later in 1986 — Microsoft's Xenix 5.0 multi-user Unix lookalike.

Also on the Tandy stand was the recently-announced Model 600 lap-held machine, bringing some IBM compatibility to the company's portable line. The 600 comes with an 80C88 processor, the CMOS version of Intel's 8088, driving 32k RAM expandable to 224k. A single 3½in floppy drive holding 360k is built-in, and the flip-up liquid crystal display shows 16 lines of 80 columns. Applications software is Microsoft Works, giving file management, database, word processing, spreadsheet, calendar and communications functions in ROM. These are portable versions of Microsoft's mainstream PC packages such as Multiplan and Word. Price is \$1599.

IBM

An eye-catching feature on the enor-



The Tandy 600 with built-in Microsoft software



The Tandy 3000 AT lookalike

SHOW REPORT



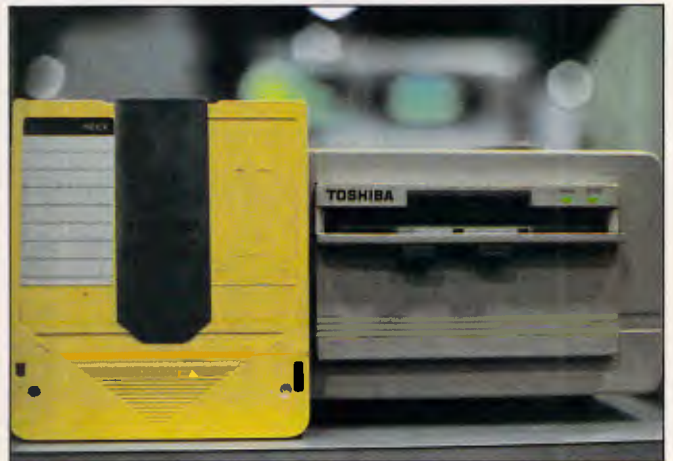
IBM's giant flat-panel plasma graphics display



MAD Intelligent Systems' D1000 workstation



The QMS Kiss, the first sub-\$2000 laser printer



Toshiba's 5 1/4 in write-once optical drive and cartridge



Western Digital's FileCard prototype



Mountain's 20Mbyte plug-in DriveCard for the PC

mous but subdued IBM stand was a plasma panel display for the PC, giving a 17 in diagonal screen display and 960 x 768 resolution.

The Personal Computer Information Panel, as IBM pretentiously calls it, has been available as an optional mainframe terminal since 1983. Now the company has produced a suitable adaptor and driver to plug into the PC or XT, and PC

users can hang the 2 in-thick panel on their office wall.

The only drawback is the price, with the display costing \$3695 and the adaptor an extra \$1495.

Also on the IBM display, and sending a shudder round the host of manufacturers launching laser printers, was IBM's Pageprinter. This uses LED array technology, rather than a scanning laser, to create its print image.

KENTEK

Kentek followed the IBM line rather than the laser line, with the launch of the LED-based K-2 Intelligent Page Printer. The K-2 has lower resolution than most laser units, at 240 dots per inch, and costs more than most at \$7995. But Kentek claims that the LED array is more reliable than laser systems, and that it can print higher volumes before maintenance.

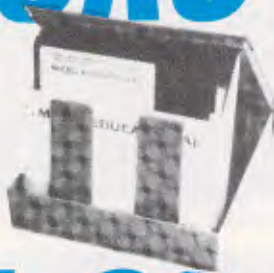


MICRO-EDUCATIONAL

VIATEL
★49001#

40 LAMAN ST, NEWCASTLE (049) 26 4122
AUSTRALIA'S LARGEST COMPUTER MAIL-ORDER COMPANY

DISKS



5 1/4" SSDD
CONTROL DATA
OR
VERBATIM MFR

\$1.80

INC TAX

(\$170 per 100. Tax Ex prices: \$1.60 ea. \$150/100)
DSDD \$3.20 3 1/2" SSDD \$6 DSDD \$8

OUR LOWEST PRICE EVER



Hello again,
Well, we're gear-
ing up for mas-
sive expansion in
1986 and to start
the ball rolling

we've dropped disk prices to their lowest point ever at \$1.80 inc tax, \$1.60 ex. And to find all those Apple and IBM PC owners who aren't yet on our 20,000 plus mailing list, we're giving away free our latest public domain Library Disk. Packed with great utilities. If you've never bought anything from Micro Ed, now's your chance. Free library disks, free newsletters, Friend-of-the-family prices, overnight courier delivery, STD-FREE phone ordering, 10 day money back and 6 months service warranties and the best people in the business to deal with. Us. What are you waiting for?

Regards

George.

On top-quality, Australian-made SSDD 5 1/4" CONTROL DATA or VERBATIM (Specify brand required) disks. Suit Apple, Commodore, IBM, etc.

WHY DO WE DO IT?

We're crazy, I know. Even Dick Smith sells disks at \$2.70 so why \$1.80? Well I've always wanted to be the first to sell a MILLION DISKS in a year. And 1986 is the year!

OUR BEST SELLERS

**MAINS
LINE
FILTER**

**COMPUTER
PROTECTOR**

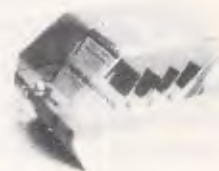
**SUPER 5
SLIMLINE
DRIVE**

JOYSTICK

\$345

**SUPER 5
ENP 1090
PRINTER**

**SWS 60
DISK
STORAGE
BOX**



FREE CATALOG
OUT NOW
1986



MICRO-EDUCATIONAL

40 LAMAN ST, NEWCASTLE (049) 26 4122
AUSTRALIA'S LARGEST COMPUTER MAIL-ORDER COMPANY

FREE SOFTWARE for your Apple or IBM

Yours FREE for the asking.

Over the years we have put together a collection of APPLE and IBM utilities that we use in programming and hardware development. These are now a library of 4 Apple disks and one IBM disk. We normally give one of these disks away free with any purchase over \$50 but as a special introductory offer to YOUR COMPUTER readers I have decided to release our latest Apple Library Disk #4 or IBM Library Disk #1 yours free for the asking. These disks are packed with graphics routines, games, special effects, communications utilities etc, together with our latest catalog and price list.

It is yours FREE! Just fill in the form and mail it to me, GEORGE PARRY, MICRO-ED PO BOX 154, CHARLESTOWN 2290, together with 6 x 33c stamps to cover post and packaging and I will post it to you by return mail. Apple owners may also purchase Library Disks 1, 2 and 3 separately at \$10 for all three; \$7 for two, or \$4 for one, and like us, I am sure you will find them INCREDIBLY USEFUL!

WHY DO WE DO IT! To introduce you to Australia's largest and oldest computer mail-order company. We have 16,000 customers throughout Australia, and no wonder — We have been trading over 7 years, we sell the cheapest disks in Australia at \$1.80 each, overnight delivery, free newsletters, full service and money back warranties, etc, etc.

WHO BUYS COMPUTER GEAR FROM MICRO ED? Just about everybody. More than half the high schools in Australia, every university, most of the large accounting firms, almost 10% of the Apple owners in Australia, etc.

HOW DO YOU DO IT? EASY. Just fill in the enclosed form and post it to me. Or even easier, pick up the phone and order STD-FREE on BANKCARD on our ORDER HOTLINE (008) 02-5229 for overnight delivery.



008 02 5229

BANKCARD IT NOW STD FREE

FREE DISK ORDER FORM

Post to:
GEORGE PARRY
MICRO-ED
PO BOX 154
CHARLESTOWN 2290

Dear George,
Please rush me my FREE LIBRARY DISK for my APPLE II+/ 11e/ 11c/ IBM PC.

NAME: ADDRESS:
..... P/CODE:

I enclose 6 x 33c stamps to cover post and packing.
PS: While I'm at it would you also send me the following by post or overnight courier:

..... (+ \$6 COURIER)

Enclosed please find cheque/Bankcard/MasterCard/VISA #
PS: Please add the following computers owners to your free newsletter mailing list.

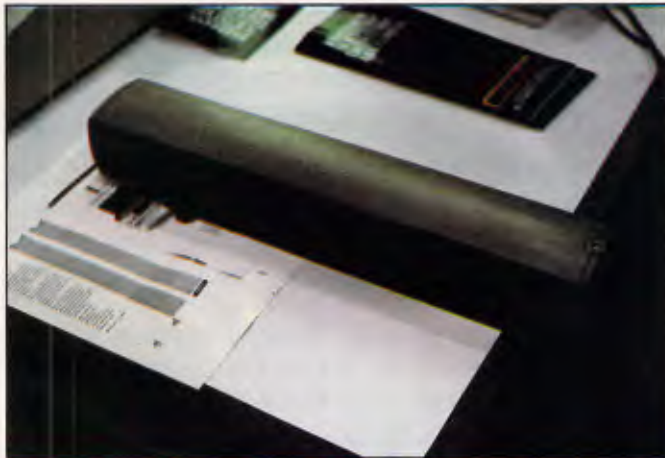
SHOW REPORT



Kaypro's \$1500 IBM-compatible PC



ITT Qume's LaserTen 10 pages-per-minute laser printer



Cauzin's SoftStrip reader in action



Sanyo's MBC 990 AT lookalike running Microsoft Windows

The print speed is given, rather oddly, as 24,000 pages per month.

The printer has its own 68000 processor and 5¼in floppy disk drive, and up to 30 font type styles of 154 characters each can be stored on each disk. The disks can also be loaded with standard form layouts, logos, and other useful things.

KODAK/DATA/ TECHNOLOGY

Although Kodak got most of the attention with its high-capacity floppy drives, the 10Mbytes drive on its stand was actually based on joint design 'breakthrough' with Data Technology.

The 10Mbytes drive uses 5¼in, hard-cased floppy disks, and comes with an intelligent SCSI controller allowing it to plug into any computer system.

According to Data Technology marketing man Mike Kirby the drive will be available to OEMs in the second quarter

of 1986, and Data Technology will also sell packaged internal and external drives for the Apple and IBM retail markets through its TeamMate division.

Prices will be 'extremely competitive' with removable Winchester disk systems.

On the Kodak stand, alongside the 10Mbytes drive, were 2.8Mbytes and 5.25Mbytes drives using more conventional 5¼in floppy disks. The disks, using high-density recording media, are being made by Kodak subsidiary Verbatim.

MAD

The neatly-named MAD Intelligent Systems was showing its MAD-2 AT lookalike, and trumpeting an OEM deal that will put the machine on the market under the Philips banner.

The D1000 is described as a Desk-top Workstation, and comes with IBM Professional Graphics and GEM support

running MS-DOS 3.1, Concurrent DOS 286 and the Xenix Unix lookalike.

Also available is an 80286-based network file server, the F2000.

Philips has signed up for the D1000, with volume shipments starting early this year, and MAD expects to rake in \$15 million to \$20 million from the deal during 1986.

MANZANA

California-based Manzana has come up with a range of 720k 3½in floppy drives for the IBM PC, aimed at simplifying transfer of data between PCs and machines such as the DG One, Kaypro 2000, GridCase, Texas Pro-Lite, HP 110 and 150, Apricot and Atari 520ST. The company also claims that the PC will be able to format 3½in disks for 'most of these computers'.

There are two external drive units and one internal; the internal unit fits in a standard half-height 5¼in slot, while the

The new Amstrad 6128.

A comparable 128K computer could easily cost you twice as much.

The popular Amstrad personal computers have quickly become top sellers in Europe and Australia, and have established an enviable "value for money" reputation. Now comes the remarkable Amstrad 6128 computer.

The Amstrad 6128 offers a powerful 128K memory, high definition green screen monitor, inbuilt disc drive and sophisticated CP/M PLUS* operating system from around \$800 all up. (Colour monitor package from around \$1000.) Other computers with similar capabilities can cost hundreds or even thousands of dollars more.

\$800 package offers real value for home or business.

- Powerful 128K computer
- High definition green screen monitor
- Inbuilt floppy disc drive
- CP/M PLUS* and AMSDOS operating systems
- GSX Graphics Enhancement
- Comprehensive User Manual
- Introductory program and exercises

Rapid loading, instant cataloguing.

The availability of such a low cost, disc based 128K system is a real breakthrough for both businesses and home computer enthusiasts. Programs are loaded rapidly and cataloguing is instantaneous. The CP/M PLUS* operating system is acknowledged as one

of the best and most practical in the world.

Other key features of the Amstrad 6128 system include a highly functional alpha-numerical keypad with programmable function keys and broad sound and graphics capabilities. Thus, the system offers considerable scope not only for educational and entertainment uses but also for many serious business requirements.

Wide range of programs available now.

Most of the programs developed for the Amstrad 464 and 664 computers can be used on the 6128. These cover a broad range of subjects including Business, Education, Games, Brain Power, Programming and Electronic Home.

In addition, there is an excellent range of custom CP/M PLUS* disc-based programs available.

In all, there are hundreds of titles to choose from covering all aspects of personal and business computing. Programs include Wordprocessing, Spreadsheets, Graphics, Accounting and many popular games. The Amstrad 6128 computer offers a wealth of applications for home and business.



Amstrad. Distributed and guaranteed by AWA-Thorn.

Amstrad computers are distributed and guaranteed by AWA-Thorn, one of Australia's most trusted names in home products. The new 6128 system is available at leading retailers and computer stores throughout Australia. Ask for a demonstration and you'll agree – no other system adds up to Amstrad.

For the location of your nearest Amstrad dealer, please telephone: Sydney, 638 8444; Newcastle, 52 7088; Melbourne, 459 1688; Brisbane, 44 7211; Townsville, 72 7755; Canberra, 80 5314; Adelaide, 269 1966; Perth, 277 7788; Hobart, 72 4366; Darwin, 84 3243

*CP/M PLUS is a registered trademark of Digital Research

AMSTRAD

Distributed and guaranteed throughout Australia by

AWA-THORN

TPB/623

SHOW REPORT

external drives come in single-drive and dual-drive styles. If the PC, XT or compatible has the 37-pin external floppy drive connector, the drives just plug into that. If the connector is missing, as on the AT or on some compatibles, an extra accessory pack allows two external floppy drives to be used.

The single external drive for the PC costs \$550 if the external connector exists, \$660 if it doesn't. The prices for the dual drives and for the internal drive have yet to be announced, although Manzana promises shipments during the first quarter of 1986.

QMS

The cheapest page printer at the show, among the large number of newcomers, was the QMS Kiss laser printer at \$1995.

QMS has trimmed performance to fit the price, since the Kiss can only print six pages per minute at 300 dots per inch resolution against the more common eight pages, and has only 128k RAM to back up its resident 68000 processor. But it can emulate Diablo, Epson and Qume printers, and comes with nine resident fonts and up to 40 different print combinations. The interface is Centronics as standard, with an RS232 option.

According to QMS president Jim Busby, the market for this type of machine is enormous. 'Industry analysts predict that approximately 200,000 non-impact printers in the zero-to-ten page per minute range will be sold in 1986 in the US, totalling over \$700 million,' he says. Busby now expects that, thanks to Kiss, the size of the overall market will 'increase dramatically'.

OPTOTECH/TOSHIBA

Both Optotech and Toshiba were showing 5¼in write-on optical disk drives designed to replace ordinary, full-height floppies or Winchester.

The Optotech drive was shown installed in an IBM PC, while Toshiba's was cased up as an external add-on.

Both drives encase the CD-sized optical disk in a hard plastic shell, although each company has chosen a different design for the case and its protective metal shutter.

The Optotech drive offers 200Mbytes of formatted capacity per side, with an average access time of 131 milliseconds (50 per cent slower than most Winchesters) and data transfer rates of 2.2 megabits per second. An evaluation kit comprising the drive with one disk cartridge, and IBM PC controller board, and PC-DOS file management and access

software, costs \$5000. The bare drive costs \$3000 if you want fewer than 10, going down to \$975 if you want between 10,000 and 25,000 units.

Toshiba's DF-050 has similar performance and capacity figures, and the prices are expected to be lower.

TANDON/MOUNTAIN/ WESTERN DIGITAL/PLUS DEVELOPMENT

One product development that spread across the show was the hard disk drive mounted on a single PC add-on board, shown by at least four manufacturers.

The originator of the idea, Plus Development, had some of its thunder stolen by the later entries but still put a brave face on it. Their 10Mbytes board only takes up a single PC slot, and can go in any slot in a PC; the company is marketing the HardCard as a renovation tool for existing PCs, Compaqs or compatibles that could do with a Winchester shot in the arm.

The Mountain Computer DriveCard, on the other hand, gives you 20Mbytes of storage but takes up one-and-a-half slots — that is, it takes up one slot at the very end of the row, or one-and-a-half anywhere else.

Disk drive specialist Tandon entered the race late with the Diskard 21, which, according to the company, 'installs in most systems using only a single slot.'

And Western Digital's FileCard attempts to be a trump by adding an unpopulated piggy-back RAM board capable of adding 512k to the 10Mbytes Winchester on the board.

All these boards are priced between \$1000 and \$1200 end-user, and the differences between them — apart from the obvious difficulties of finding more puns on the card theme — were the thickness of the board and the power consumption. These cards consume power up in the tens of watts, and with old PCs loaded up with add-ons, this could be the last straw for the power supply. The XT supply, with its 135W capacity, is essential for one of these.

The interesting entry into the Winchester card market is Western Digital, since the idea has tempted the company out into the retail market for the first time. Previously, it specialised in making disk controller chips and boards containing those chips for other hard disk and computer makers. The temptation of this new market obviously became too much.

KAYPRO

While everyone else was launching AT

clones, Kaypro — which was first into the AT cloning business with its 286i — took a step backwards with its first PC-compatible.

Costing \$1595, the Kaypro PC is the first machine in its range to abandon the blue steel casing once described as being reminiscent of Darth Vader's lunchbox. Now tailored in beige sheet metal, the PC comes with an 8088 processor, 256k RAM, serial and parallel ports, twin 360k floppies, an external 12in green monitor and nine expansion slots. The software bundle includes WordStar, Mailmerge, CorrectStar, StarIndex, PolyWindows pop-up desk accessories, Mite telecomms, GWBasic, and MS-DOS.

QUME

ITT's Qume subsidiary, best known for its daisywheel printers, launched its first non-impact printer at the show.

The LaserTen, jointly developed by Qume and Hitachi, prints in the normal 300 dot-per-inch resolution, but at 10 pages per minute rather than the more usual eight.

Interfacing is done via Qume's plug-in modular interfaces, familiar from their daisywheels, and it emulates a Qume printer as far as software drivers are concerned. Up to 19 font styles, in sizes from 7pt to 24pt, can be accessed per page.

Two versions are available: the first with 128k RAM to support its 68000 and costing \$2795; and the second with 512k for graphics support, and costing \$3395.

WESTERN AUTOMATION

Western Automation Labs was showing its Dasch RAM disk for the Macintosh — not an internal one, but an external box that plugs onto one of the Mac's two serial ports.

The Dasch comes with 500k, 1000k or 2000k of RAM disk, at prices of \$495, \$795 and \$1295 respectively, and units can be daisy-chained to give up to 32Mbytes of storage space. Software provided also allows the Dasch to act as a print spooler when it is plugged into the printer port, since the unit has an extender serial port on the back.

CORONA/SANYO/ TATUNG/NCR/VICTOR

The rest of the AT wave at the show, aside from the really cheap Taiwanese kits of parts (\$1995 was the low-price record), came from a set of well-known names.

The specifications were all similar, as

SAVE A STACK WITH COMPU**S**HACK

(While the stock last)

MLC CENTRE
SYDNEY CITY
(02) 235 2455

1/303 PACIFIC HWY
LINDFIELD
(02) 467 1933

GREENWAY SHOPPING ARCADE
CHURCH ST PARRAMATTA
(02) 635 6020

NEWLY ARRIVED COMPUTERS

*The Commodore Amiga Computer
limited stock get yours now.*

The Apple Macintosh Plus bundle.
Mack Plus Computer Image Writer II
and accessory kit was **\$5395**
Save **\$200** Introductory offer **\$5195**

A great back to school pack. The
mighty Memoteck 500 computer clearance
sale was **\$499** Save **\$300** now only **\$199**
(Includes 5 games and programmers book)

More end of Summer sales

Apple Works was **\$325**
Save **\$100** Now yours
for **\$225**

Multiplan for C64 was
selling for **\$159.95**. Yours
for **\$99** a saving of over **\$60**

TCA brand DSDD diskettes
pack of ten yours
for **\$34.95**

Diskette storage
boxes from **\$25.95**

Diskette doublers from
an incredible
low **\$9.95**

Blank computer tapes from
an amazing 50 cents each.
Minimum purchase of 4

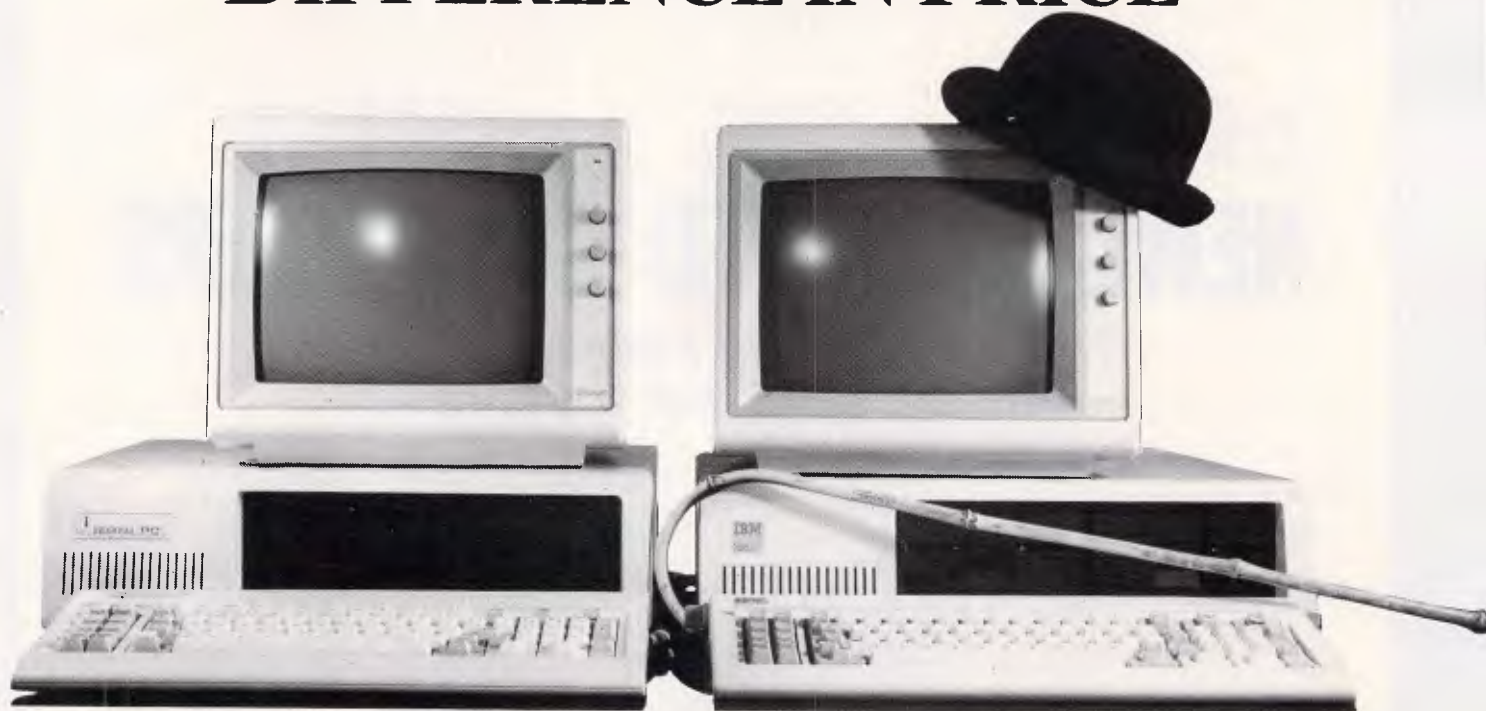
*Come in and see our quality range
of Epson Printers, Joysticks, IBM clones
and many many more products.*

*Remember our third annual auction and sale
to be held February 22nd. Enquire at
your nearest branch for details*

Authorised Apple Dealer

Don't Miss Out

SINCE THERE'S LITTLE DIFFERENCE IN PERFORMANCE YOU SHOULD LOOK FOR THE DIFFERENCE IN PRICE



...and the product warranty

There are a lot of different personal computers available in Australia, many with similar technical features and prices. Now, Chendai would like to introduce you to our fully compatible PC that has all the functionality of the others but is priced from around \$1450, and comes with a level of customer support that makes the others envious. Every PC retailed by Chendai is backed by a **DATA CRAFT** six month Australia-wide warranty.

So if you want guaranteed reliability and compatibility, as well as saving hundreds of dollars, call us today.



CHENDAI

*...funny name,
outstanding PCs.*

109 Drummond Street, Carlton, Vic. 3053. Phone: (03) 663 3030.

N.S.W. (02) 85 7540, W.A. (09) 227 8952, S.A. (08) 45 9820, A.C.T. (062) 51 2525.

SHOW REPORT

were the prices, undercutting the IBM original by percentages ranging up to 40 for the same hardware configuration, and claiming advantages in performance, expansion facilities and price, or a combination of the three.

Corona Data Systems, which has just changed its name to Cordata, launched the ATD range of desk-tops to follow up its 80286-based portable, the ATP. The ATD processor runs at 8MHz rather than the AT's standard 6MHz and chairman Bob Harp claims that, thanks to no-wait-state memory, the ATD and ATP run 'over 60 per cent faster than the IBM PC/AT.' Standard memory is 640k, and disk options include one 1.2Mbytes floppy drive and 20 or 40Mbytes Winchester.

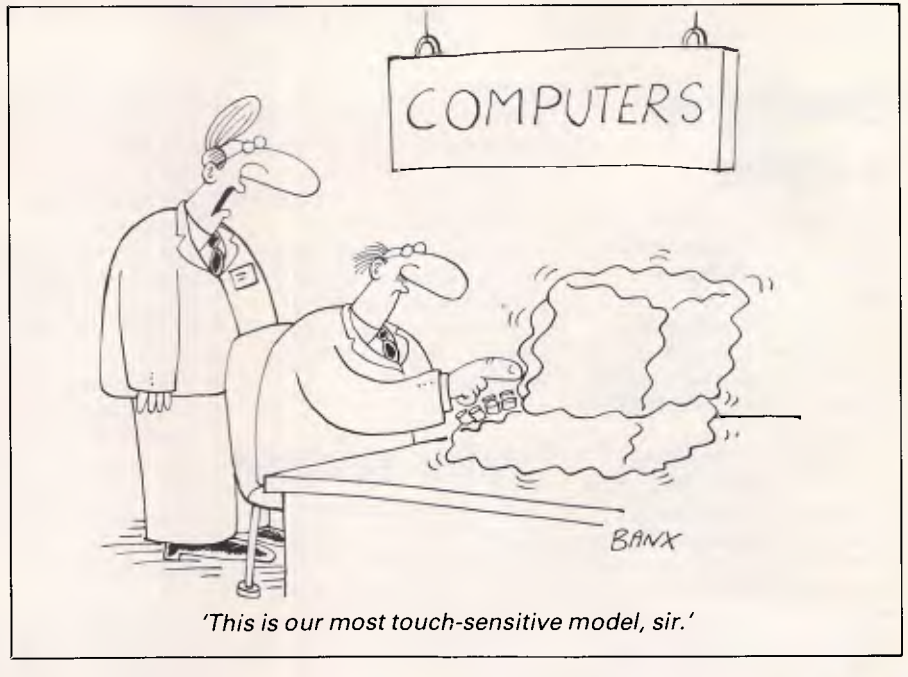
Also standard with the ATD are serial and parallel ports, a colour and monochrome graphics card, four AT slots and two PC slots, and a 14in green monitor.

Price is \$3995 for the single-floppy machine, going up to \$5495 for the 20Mbytes Winchester version.

Meanwhile, Sanyo released the MBC 990 and 512k RAM as standard, six AT slots and two PC slots; NCR launched the PC8 with 256k RAM expandable to

640k on the main board and eight AT slots; and Tatung launched the TCS-7000 at the OEM market only, with 512k RAM and all the usual options.

According to Tatung's Julius Chiang, his machine will only be sold in large numbers, and the price depends on just how large those orders are. **END**



Life without power protection isn't funny.

Sola Australia — the Power Protectors
Line conditioners and UPS systems for all electronic equipment.

SOLA

Melb. (03) 791 1033 Syd. (02) 949 6000 D'win. (089) 84 4255 C'bra. (062) 97 6044
Perth (09) 45: 9200 Adel (08) 268 2655 Bris. (07) 369 0344 Hob. (002) 34 3194

Sol./ST/71

PANASONIC OWNERS

VICTORIA/ALL STATES

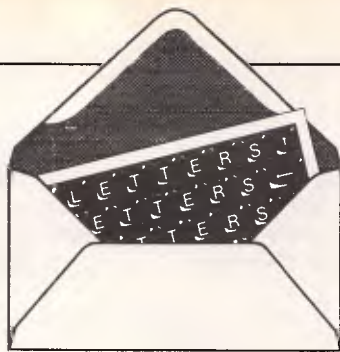
DO YOU NEED?

1. Ms Dos 2.1 (Now Available)
2. Hardware — Accessories
3. Software Configuration
4. Training — Support
5. Buy back and trade-in

FREE DELIVERY THROUGHOUT AUSTRALIA
FULL 90 DAY WARRANTY
CALL THE PANASONIC EXPERTS NOW!

MARQUE computing

(03) 419 0344



This is the chance to air your views — mail to 'Letters', Australian Personal Computer, 2nd Floor, 215 Clarence Street, Sydney 2000. Please be as brief as possible and add 'not for publication' if your letter is to be kept private.

Clearing up a cypher

The article 'The hidden meaning', *APC*, December 1985, was a little misleading.

The considerable difference between a code and a cypher was ignored. Indeed, the terms were interchanged erroneously.

A cypher is considered secure if it takes a long time to break. For example, if a recovered message refers to an event of a week ago, then the cypher was secure. The Public Key has never been considered as having a life of more than 20 years or so; now even that has gone, as a method of gaining entry has been found.

The degree of security chosen should match the importance of the message — it would be detrimental to an intricate system to have it encypher tomorrow's racing tips.

There are hundreds of ways to encrypt a message. Railfence, Ragbaby, Playfair, Morbit and Quagmire are some which show the humour of the cryptanalyst and the colour of the subject!

Of the two main categories, transposition is more difficult to break than substitution.

Computers can be very helpful, but most of the useful programs are aids, rather than solutions: cypher text in — plain text out. (The Homophonic is an exception, and who would have thought that logarithms would be of use in text analysis?) There is a lot of software available, usually developed or adapted to help the amateur solver, and it is generally public domain —

such is the spirit of the amateur cryptanalyst! It is reminiscent of the 'original' computer enthusiast.

The potential of computers in this field is largely untapped. There are very few participants indeed, surely due to the lack of information on this fascinating and satisfying hobby.
W Higginson

Cypher solution

I was rather appalled at the article 'The hidden meaning' in the December 1985 issue of *APC*. The cypher system it presents was invented by a Frenchman called Vigenere in the 18th century and solved by the Prussian Military in the 19th (F Kasiski, *Die Geheime Schriften und die Dechiffrierkunst* (Mittler und Sohn, 1863)).

The method of solution is to do an autocorrelation to extract the keyword length n , and then do statistical analysis of the sets $(\text{char}(k) \pmod{n})$ for $k=0, \dots, n-1$ to obtain the letter shifts. This can be done manually, and in fact the use of non-alphanumeric characters in the cyphertext character set makes the task even easier than with the original manually implemented, 18th-century version.

R Anderson

WordStar and the Juki

I use a Juki 6100 daisy-wheel printer and WordStar 3.3, and find myself continually requiring the less-than and greater-than signs, as well as the squared sign. These characters are present on the daisywheel (for

example, the Elite Modern 12), but I have not found any way of using all three characters simultaneously. The degree sign would also be useful.

Is there any way I can use these characters? Is there a daisywheel of maths symbols available for the Juki?

My second problem concerns variable spacing and the WordStar commands .CW and .LN, which do not seem to have any effect. How can I utilise them with the Juki?

K Campbell

It sounds as if your copy of WordStar has been incorrectly installed. WordStar can drive many different types of printer, but the way in which the more esoteric features are called up varies from one make of printer to another. Before you start using WordStar, run the Winstall program (supplied with the word processor). This asks various questions about your printer and then produces a 'customised' version of WordStar which knows about your printer's special features. If you don't install the word processor properly, you are restricted to the simple plain vanilla features common to most printers.

When you run Winstall you will not see the Juki on the list of printers which are supported; don't panic, because the Juki works almost exactly like a Diablo 630. Select that option on the main menu and you will have access to most of the Juki features, with the exception of shadow printing. .CW and .LN should then

work properly.

The User Function option lets you gain control over the extra characters; these are each generated by a two-character sequence: an Escape character — CHR\$(27) — followed by a letter. There are six extra characters on every daisywheel, corresponding to the letters H, I, J, K, Y and Z. In each case, remember, you should precede the letter with CHR\$(27). The exact character you get will depend upon the daisywheel, but these sequences should give you access to all 100 characters on the wheel.

The procedure to set up user functions is too complicated to go into here, but it is well explained in the new Juki Manual (ring-bound, with a blue cover). Contact your dealer to get hold of a copy: it is the best peripheral user manual I have ever seen, and a far cry from the Janglish manual supplied with the first Jukis.

A little lateral thinking indicates that you can generate the squared sign and the degree sign on any wheel, even if it does not have appropriate characters. Select Super-script mode, with Control PT, and then type a 2 or a lower-case 'o'. Both characters will be printed above the base-line, so that they appear as a squared sign and a degree sign respectively. Use Control PT after the character to move subsequent characters back to the base-line. You can also generate subscripts if you use Control PV in a similar way.

Neither of these tricks will work until you install the word processor correctly — superscripts and subscripts are not plain vanilla features. You may need to change the line-spacing of your file (with Control OS 2, or .LH) to stop the subscripts and superscripts running together between one line and the next.

I don't think there is a daisywheel of mathematical symbols available for the Juki, but you can use Adler daisywheels in the printer so you might be able to use a typewriter wheel, if you can track down an appropriate one. It is hard to be categorical about this, since Juki can make special wheels to order, but I haven't seen a maths wheel in any catalogue. Custom-made wheels are very expensive — a one-off costs several thousand dollars — so it would probably be more cost-effective to replace your printer with one for which a maths wheel was already available.
SG

The serial serial

I have a technical problem in connecting my Smith Corona printer to an Apple II+ computer. I use a serial printer interface purchased in Hong Kong.

The problem is that the printer's 12-characters-per-second is too slow to cope with the output from programs such as dBasell and WordStar. Can you suggest any remedies?

I am also interested in getting a dot matrix printer and would be grateful if you could help me to decide between the Epson printers and the Apple Imagewriter.
Dr D Ho

The so-called *simple* serial interface seems to have been the most

popular topic for questions over the last few months, so I will try to answer your question in general terms. The problem you describe is most unlikely to be due to a fault in the printer, the computer or the interface: it is almost certainly a consequence of the way that you are using them together. Once again I must advise readers to check that their system components are compatible before they hand over their money — this is the type of problem that equipment suppliers should be expected to sort out for you.

A serial interface (generally known as an RS232 or RS423) is a two-way link which passes information bit by bit along a single wire. Other wires are used to control the data flow — to indicate that there is data to be sent, and to indicate that the receiving device is 'listening'. If these control wires are wrongly connected, the sending device may transmit characters when the receiver is not ready to accept them so that characters are 'lost' — this sounds as if it is your problem.

Serial interfaces are generally connected via a 25-way 'D-type' plug. Pins 2 and 3 are used to convey the control information. It may be that your computer and your printer both think that they are in control of the link, and are both using the same wire to issue instructions. This leads to confusion, since they both talk at once and neither of them listen. You can cure this problem by swapping the wires to pins 2 and 3 at either end of the link. You should also ensure that pin 7 is connected at both ends of the cable.

You can adjust the baud rate of the interface and printer, but this is unlikely

SO YOU WANT TO PROGRAMME YOUR IBM PC.* NOW WHAT?

*Having trouble starting with BASIC?
Does Assembly Language leave you confused?*

We know how you feel, so we developed a complete self help Tutorial system for the programmer. THE COMPLETE PC TUTORIAL is the first Tutorial system to use the Intouch Window Teaching Technique working concurrently with the Operating System and System Software. Whether you need to learn BASIC or want to take control with Assembly Language, THE COMPLETE PC TUTORIAL is your answer.

THE COMPLETE PC TUTORIAL comes complete with manual and fills two diskettes. It requires an IBM PC or work-alike running PC-DOS or MS-DOS with 128k RAM and at least one disk drive. THE COMPLETE PC TUTORIAL is unprotected and is available from most software outlets at a recommended retail price of \$69.95. If unavailable, you may purchase directly from Intouch Australia, 1 Kent St., Bicton, Western Australia, 6157. Nearly any method of payment is accepted. Postage and packaging is free.

THE COMPLETE PC TUTORIAL — AN INTOUCH PRODUCT

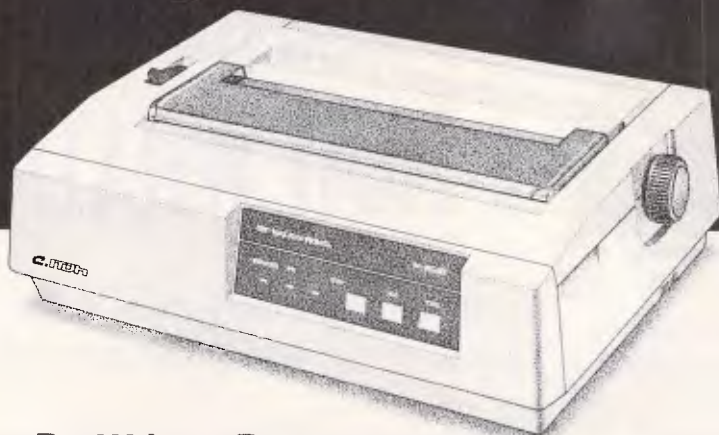
INTOUCH COMPUTING

1 Kent Street, Bicton, Western Australia 6157.

*IBM is a registered trademark of International Business Machines Corporation.

C.Itoh

For people who can't afford to get caught with their printers down.



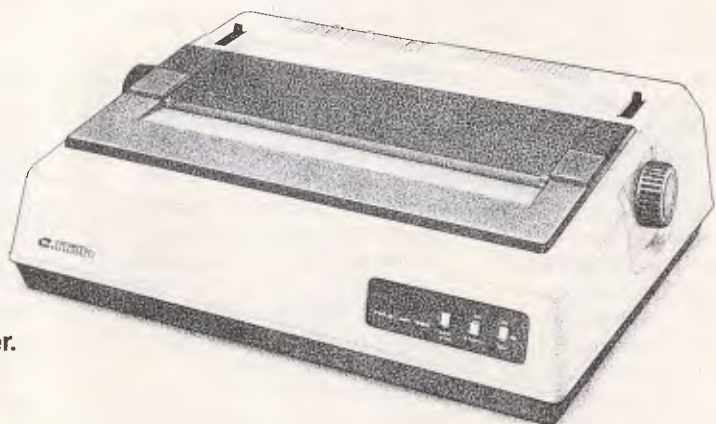
ProWriter™ Dot Matrix

- Compatible with all the most popular PCs.
- RS-232C Serial or Centronics-type parallel interface with 2K buffer.
- Speeds ranging from 105 to 180 characters per second.
- Throughput ranging from 45 to 100 printed lines per minute.
- High graphics resolution of up to 240 x 216 dots per inch.
- Friction or tractor form feed.
- Short tear-off capability.
- Full parts and labor warranty.

See the full C. Itoh Range –
Only at your Authorised C. Itoh Dealer.

Distributed exclusively in Australia by:–

anitech
A DIVISION OF THE ANI CORPORATION LTD (INC IN NSW)



StarWriter™ Daisy Wheel

- Compatible with all the most popular makes of PCs.
- Speeds range from 22 to 58 characters per second.
- Plastic daisy wheel for straight lines and superior print quality over entire life of wheel.
- Buffer size ranges from 200 Bytes to 2K-Bytes.
- Friction form feed or optional tractor feed.
- Full parts and labor warranty.

ADELAIDE: (08) 356 7333 BRISBANE: (07) 275 1766 HOBART: (002) 34 4511
MELBOURNE: (03) 795 9011 & 795 5111 PERTH: (09) 277 7000 & 277 1944
SYDNEY: (02) 648 1711 & 648 4088 AUCKLAND: (09) 444 2645

LETTERS

to help. The baud rate is the maximum speed at which characters are transmitted (assuming that the recipient is always ready to receive them). At a rate of 110 baud (the minimum on many interfaces) your printer may be able to keep up with the data even if the control wires are wrongly connected, but this is really only a temporary solution — it slows down the link needlessly and problems can still appear when many blank lines are to be printed, since most printers take much more time to process a 'new line' character than they do to print a letter or symbol.

If the baud rates at either end of the link do not match, or the format of the data (number of bits per character, error-checking information, and so on) is wrong, some or all of the characters printed will be incorrect. Make sure that both ends of the link use the same rate (300, 1200 and 9600 baud are the most popular settings) and the same format — eight bits, no parity, one start bit and two stop bits is the most general, but it doesn't matter much for text as long as at least seven bits are transmitted for each character and the rest of the format is the same at both ends of the cable.

I can't help you with your second question as it is beyond the brief of this column. We can't answer questions like 'What should I buy' since the question depends upon too many factors: the quality of dealer support in your area, the exact application you propose (and the future uses you envisage), the composition of the rest of your system, how often you use your computer, your technical proficiency, and so on. My answer might be different for every reader.

As I have stated before, you get what you pay for in the micro world, as long as you don't choose a really obscure program or machine, in which case you might get a monster or a masterpiece. The only way to find out what you want is to try before you buy. The apparent difference between products stems more from marketing than manufacture. Your best guide is your own taste, together with the reviews and readers' letters published in *APC*.
SG

'Commodore bashing'

G Willis' letter (*APC*, December '85) has stirred me to write. While I can't agree with his condemnation of *APC*'s reviews, I am sympathetic to his disappointment in Commodore.

Like him, I had a C-64 installed in my office. The machine ran a text-editor, and kept a record of accounts receivable. On the whole, it was a satisfactory, cost efficient solution.

When our office was broken into and the equipment stolen, I looked to the Commodore 128 as a replacement. After all, the existing applications software could be used and a faster disk drive (1571) was promised. Further, I was biased. Since the late 70s I have had a Commodore computer of one kind or another. (On reflection, it is amazing how one can come to be so devoted to a particular marque, regardless of its failings).

My ire, like G Willis', was also roused by Commodore's poor marketing of the C-128 and 1571. In my instance, Commodore rubbed salt into the wound by not being able to replace the Dongle, which went with the theft, of my copy of PETspeed.

Around about this time I

SO YOU'VE JUST SOLD YOUR CUSTOMER AN IBM PC.* NOW WHAT?

*Are your salespeople becoming
Computer Tutors?*

*Do your customers return with many
time consuming questions?*

We know how you feel, so we developed a complete self help Tutorial system for PC user. You cannot afford to have sales people tied up answering simple questions for the new computer user. Their job is to sell. Our job is to teach. THE COMPLETE PC TUTORIAL covers the complete spectrum of computing, from simple DOS commands to the depths of machine code. It is suitable for ANY computer user/programmer. If your customer leaves your premises with a copy of THE COMPLETE PC TUTORIAL, they will most probably return with a cheque book rather than note pad.

THE COMPLETE PC TUTORIAL comes complete with manual and fills two diskettes. It requires an IBM PC or work-alike running PC-DOS or MS-DOS with 128k RAM and at least one disk drive. THE COMPLETE PC TUTORIAL is unprotected and is available from most software outlets at a recommended retail price of \$69.95. If unavailable, you may purchase directly from Intouch Australia, 1 Kent St., Bicton, Western Australia, 6157. Nearly any method of payment is accepted. Postage and packaging is free.

THE COMPLETE PC TUTORIAL — AN INTOUCH PRODUCT

INTOUCH COMPUTING

1 Kent Street, Bicton, Western Australia 6157.

*IBM is a registered trademark of International Business Machines Corp.



The Computer Trader

Phone Order Specials
(03) 266 1995 (Reverse Charges)
we won't be beaten on PRICE!

**SUPER
TRADER
SAVINGS**

"No-one offers this Preferential Price & Performance Plan"



	RRP	Our Price
1. Lotus 1-2-3.....	835	535
2. Multimate.....	745	439
3. Open Access.....	995	665
4. Symphony.....	1095	725
5. Multiplan.....	365	295
6. Microsoft Word.....	595	465
7. Wordstar.....	445	340
8. dBase III.....	976	645
9. Attache.....	775 p.m.	CALL
10. Dataflex.....	N.A.	CALL

Courtesy PC Australia

HARDWARE		
Printers	*NEC - P2/P3 Pinwriter (Colour - 225).....	850 1195
	*NEC-P5 Pinwriter.....	CALL
	*Epson - LX80.....	415
	Colour Printers & Plotters.....	CALL
	NEC - Spinwriter E.L.F.....	695
	Epson - FX85 (FX105 S995).....	775
	Brother new models.....	CALL
	C-Itoh, Toshiha, Silver-Reed & others.....	CALL
Monitors	*Taxan Hi Res. Vision III Colour.....	650
	Taxan Hi. Res. Amher or Green.....	249
	BMC Composite.....	159
	Other Brands.....	CALL
Disk Drives	*Hard disk 10Mb internal.....	from 1250
	*Hard disk 20Mb internal.....	from 1495
	Slimline Floppy - 360K direct drive.....	285
	Floppy Drive 360K.....	250
	Hard disk greater than 20Mb.....	CALL

All quality brands: Tandon, Tallgrass, Rodime NEC & Seagate		
Tape Back-up	*Cipher 32 Mb internal.....	1695
	System 10 Mb.....	1595
Boards	*Multifunction Card.....	from 295
	*Colour/Graphics Card.....	285
	*Mono/Graphics Card.....	325
	Persyst, Sigma, Orchid, Qubic, & Paradise - excellent prices.....	CALL
Modems	PC In-Modem 1200/75.....	685
	Viatel Modem.....	CALL
	Senulata/Netcom.....	CALL
Floppy Disks	*Nashua DSDD.....	39
	*Top Quality Brand DSDD.....	25
	Disk storage unit (90 disks).....	22
	Other Brands and Sizes.....	CALL

SOFTWARE - MACINTOSH		
Business	Omnis 3.....	565
	Jazz.....	665
	Thinktank.....	255
	Microsoft.....	CALL
	Other.....	CALL
Entertainment	Baron.....	69
	Millionaire.....	69
	Zork II III.....	59

TOP SYSTEMS

	List Price	Our Price
1. IBM PC "XT" 10Mb, FDD & 256K, (Colour +425)....	6252	4845
2. Olivetti M24 "XT" 10Mb, FDD, 256K (Colour +625).....	6522	4595
3. IBM Compatible It's got everything incl. 10Mb & 512K..	N/A	2985

NOTE: Add \$300 for 20Mb and from \$200 for 256K RAM.

SOFTWARE - IBM

Spreadsheets Integrated	*Lotus 1-2-3.....	535
	*Symphony (Vers 1.1).....	725
	Enable.....	765
	Framework.....	750
	Multiplan.....	285
	Open Access.....	665
	Supercalc 3.....	399
Database	*dBASE III.....	645
	*Versaform.....	199
	Knowledgeman.....	580
	Quickcode III.....	325
Word Processing	*Wordstar.....	340
	*Multimate (advantage +80).....	439
	Perfect Writer II.....	295
	Wordperfect.....	439
	Microsoft Word and Spell.....	495
Languages	*DeSmet C.....	195
	*Turbo Pascal (toolbox +62).....	79
	*Borland Int. (Turbo).....	CALL
	Digital Research.....	CALL
	Microsoft.....	CALL
Utilities & other	*dTOOLKIT.....	99
	*Typequick.....	69
	*Smartkey.....	69
	Superkey.....	72
	Thinktank.....	215
	Sideways.....	79
	Norton Utilities (Ver 3.0).....	145
	Copywrite/Disk Explorer.....	95
	Sidkick.....	89
	GEM incl. desktop and drawer.....	CALL
	Eightymate (runs CPM80 prog. under MS-DOS).....	295
	PC Alien.....	89
	All others.....	CALL
Communications	*Crosstalk.....	175
	*Smarterm 100 (DEC Emulator).....	250
	*Smarterm 400 (D.G. Emulator).....	250
Entertainment	Flight Simulator.....	95
	Sargon III.....	65
	All Others.....	CALL
Accounting	Integrated - Drs/Crs/GL/etc.....	CALL
	Information - Business Manager I... ..	385
	Information - Payroll.....	299
	Integrity - Accounting one.....	595
	Integrity - Payroll.....	495
	CPA+.....	680
	Sybiz.....	CALL
	IAL.....	CALL
	Vertical Market.....	CALL
Project Management	*Timeline.....	485
	Harvard Project Management.....	495
	Microsoft Project.....	545

*SUPERTRADER SPECIALS

We call it 4P. It enables us to provide you with the convenience of your local computer shop and the technical support of a professional consultant.

Add up the benefits:

- TRADE DISCOUNTS OF UP TO 35% ON R.R.P.** - The Computer Trader purchases substantial volumes of hardware and software each month. You benefit from our purchasing power by receiving the lowest prices available and first option on limited offer Supertrader Specials.
- FREE CATALOGUE** - The countless hours spent each month in "shopping" for new products and in updating your knowledge can be minimised by 4P. On registering in 4P you indicate your hardware and software preferences and we prepare a catalogue tailored to your needs.
- IMMEDIATE DELIVERY DOOR TO DOOR** - If products are in stock we will have them delivered overnight to your door. A "rush" delivery fee is charged to non 4P members for this service.
- MANUFACTURERS WARRANTY** - All products supplied by The Computer Trader carry a full manufacturer's warranty. Any claims made against this warranty by 4P members will be followed up by The Computer Trader provided the terms of the warranty have been complied with.
- THE COMPUTER TRADER 30 DAY MONEY BACK GUARANTEE** - As a 4P member we will refund your money on any purchase from The Computer Trader which does not comply with the manufacturer's published specifications regardless of whether or not the default is covered by the manufacturer's warranty.
- FREE INFORMATION SERVICE** - In addition to our free catalogue 4P members receive regular bulletins on newly released products, special buys that become available and other items of interest that may not be published in the Australian press.
- LOCAL & OVERSEAS BUYING SERVICE** - If we do not already have the product you require, our experienced consultants will trace it for you - either locally or overseas.
- CORPORATE ACCOUNT PROGRAMME** - More than 50% of our clients are corporate or government organisations. The Computer Trader will supply these organisations on a purchase order basis provided they comply with our payment terms.
- QUANTITY DISCOUNTS** - The Computer Trader will offer additional discounts for volume purchases.
- Software rentals for 4P members only - on application.
- FREE TECHNICAL SUPPORT** - We have retained the services of a team of highly qualified and independent micro computer consultants who are available to answer technical queries on all products purchased from The Computer Trader. Their support is available on our special hotline free of charge to 4P members.

NO MORE WORRIES

with our free
**HOTLINE
SUPPORT**



ANY PRODUCTS NOT LISTED - CALL, CALL, CALL!

BANKCARD & VISA CARD ACCEPTED TERMS: PAYMENT ON RECEIPT OF GOODS

MANUFACTURERS' WARRANTY ON ALL PRODUCTS

Handling charges \$7.50 on all software, boards and accessories. In the unlikely event that our costs change without notice we reserve the right to alter prices.

The Computer Trader, 3 Bowen Cres., Melbourne
Telephone: (03) 266 1995 (Reverse charges Interstate/Country)

re-assessed my computer needs and desires, and decided to look at other brands.

I am bashing this letter out on a new Amstrad PCW8256 (phew!). And very happy I am, too!

Incidentally, after a week the new machine developed a hardware fault. Within 48 hours, thanks to Ambassador TV of Corrimal and AWA-Thorn, the computer was back on my desk. I recall a friend's 1541 suffering from head-alignment problems spending six weeks in Commodore's workshop.

My suggestion then, to anyone with a C-64 and seeking to update to something faster and larger, is keep the 64 to run all that software you have accumulated. Buy something along the lines of the Amstrad 6128 or 8256 and you'll have the best of both worlds.

P Du Parte

Scarce CP/M

I am astounded, and frustrated, at the impossibility of obtaining CP/M disk software.

No matter what commercial outlets I contact, the universal reply is, "sorry, we only deal in IBM and Apple". What is the use of that — I want software, not fruit.

Cast a quick eye over all your ads for as many back issues that will fit on your desk and you will find an occasional mention of CP/M software. When firms are contacted, they invariably have no catalogue or list. Apparently one is required to acquire ESP because you have to know exactly what programs you want before they will talk to you. It is something like having to name a particular star you want to see, before you are permitted to raise your eyes to the heavens.

Where are all these "tens of thousands" of programs which are spoken of as being available for CP/M? Perhaps I should lift my

game and say "CP/M 2.2"!

I am tapping away at my space-age electronic super-clutz model with twin V8 turbo overdrives, and, (with my powerful intellect) I manage to have it endlessly loop my name and choose my lotto numbers.

Please, somebody, (or something) out there, tell me where I can buy some brains to stuff into this "brain". Just like the thousands of ephemeral CP/M programs out there, there are thousands of computerees out here, in the dark, waiting for some deity to hand them an electronic candle.

You may find it hard to believe, surrounded by the hurley-burley of "Orchard International Business Clone" land, but most of us are not in the league of the Kevin Riordans and the Mike Muges of this world, both of whom seem to use "fruit machines" anyway.

Seriously, neither you, your advertisers, nor your competition are presently of any help to the great unwashed hoard of computer-illiterate CP/M operators.

Graham Dunkley

Commercial CP/M software is advertised, (although not very often) in APC and other magazines and the programs are usually listed in the advertisement.

CP/M Public Domain software is available from Select Software, 3 Barrack Street, Sydney NSW 2000. (02) 29 2866. A charge of \$15 per disk covers copying and postage.

END

SO YOU'RE A FRUSTRATED HACKER WITH AN IBM PC.* NOW WHAT?

*Is it difficult to find concise information?
Are you finding the manuals hard to understand?*

We know how you feel, so we developed a self help Tutorial system for the Hacker. You can now take total control of your PC without have to spend weeks or months deciphering the various manuals. Topics such as machine code programming on the 8088 CPU chip, screen display, graphics control, interrupts, calls, functions, speaker control and keyboard control plus many, many more are covered.

THE COMPLETE PC TUTORIAL probably uses the most powerful and effective software teaching method currently available. If you want to be a real IBM PC hacker, THE COMPLETE PC TUTORIAL is just what you have been looking for!

THE COMPLETE PC TUTORIAL comes complete with manual and fills two diskettes. It requires an IBM PC or work-alike running PC-DOS or MS-DOS with 128k RAM and at least one disk drive. THE COMPLETE PC TUTORIAL is unprotected and is available from most software outlets at a recommended retail price of \$69.95. If unavailable, you may purchase directly from Intouch Australia, 1 Kent St., Bicton, Western Australia, 6157. Nearly any method of payment is accepted. Postage and packaging is free.

THE COMPLETE PC TUTORIAL — AN INTOUCH PRODUCT

INTOUCH COMPUTING

1 Kent Street, Bicton, Western Australia 6157.

*IBM is a registered trademark of International Business Machines Corp.

Macman at Rob's Computer Center

New Mac Plus – twice the Mac

New Macintosh Plus gives you twice the memory (1 megabyte), twice the disk storage (800k), twice the speed, a new larger keyboard, and industry standard S.C.S.I. ports so you can expand your Macintosh Plus like never before. All this for \$4495. Only \$100 more than the old 512k Macintosh. Phone now and we will give you a free box of Diskettes worth \$95.

Save \$1400 on the 512k Macintosh

The Fat Mac must make way for the new Macintosh Plus. 512k Macintosh was \$4395 but it can now be yours for only \$2995 while stocks last. Hurry.

Macintosh Plus upgrade

If you're lucky enough to own a Macintosh already then don't miss out on the new Mac Plus features. We can give you an Authorised Apple Macintosh Plus Upgrade. It's just like getting a new computer.

Diskdrive upgrade \$695

Exchange internal drive for new 800k drive.

Logic board upgrade

512k to 1 megabyte Mac Plus board **\$1345**

128k to 1 megabyte Mac Plus board **\$1845**

Keyboard upgrade

Swap your old keyboard for the new one **\$275**

Complete upgrade

Upgrade your drive, logic board & keyboard at once and save \$165!

For Macintosh 512k units **\$2150**

For Macintosh 128k units **\$2650**

800k external drive upgrade

Change your 400k single side drive for the new 800k double side drive **\$495**

Phone now for more information

Don't delay phone (03) 791 2900 for more New Year specials.



COMPUTER CENTER

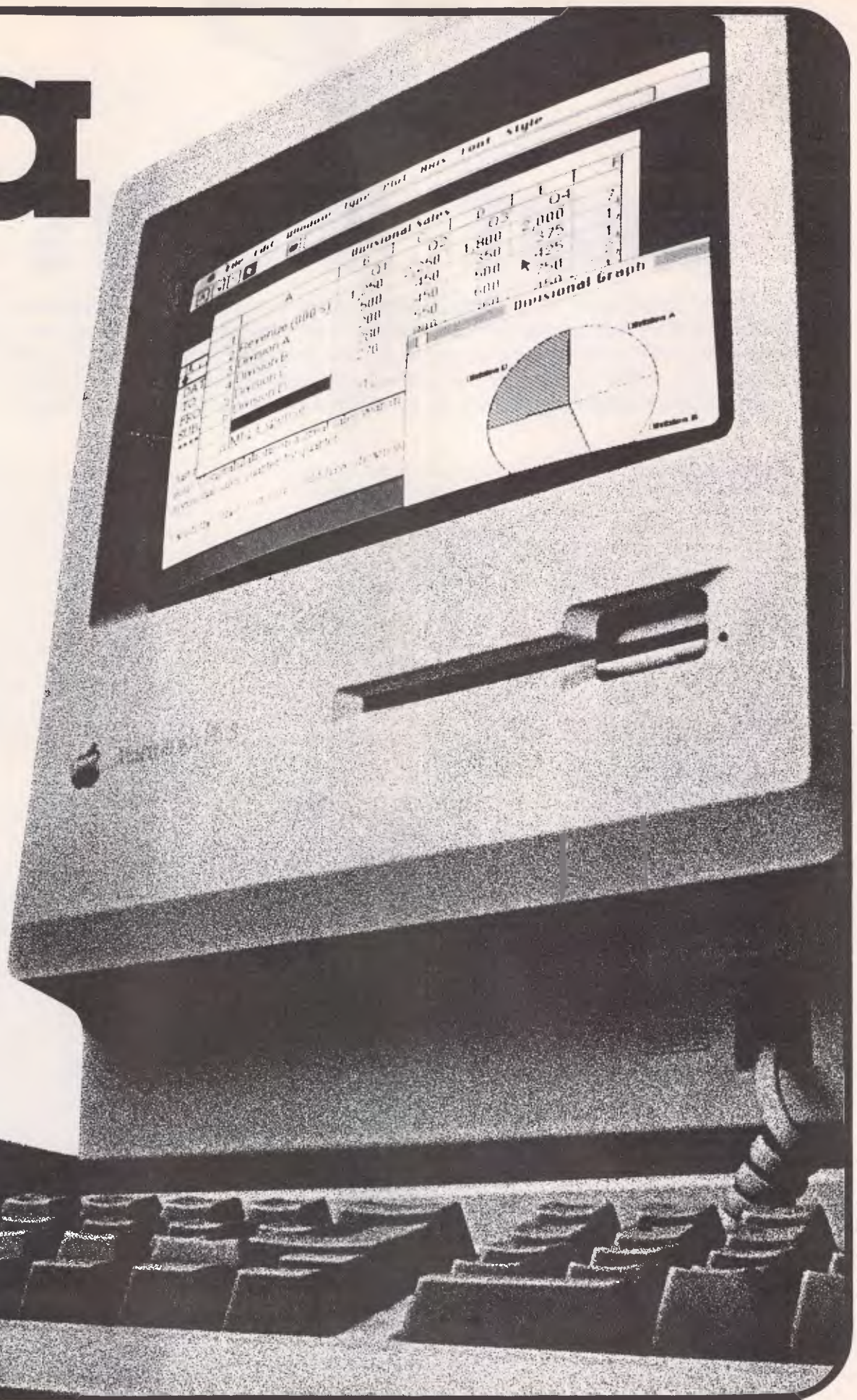
295 Thomas Street, Dandenong 3175

Phone (03) 7912900

IK96



ia er





Smart Answers

Real-world interfaces for personal computers are few and far between — the promised days when computers will do everything from making tea in the morning to putting the cat out at night are just as far off as they were fifteen years ago. So when we found out about a means of turning a computer into an intelligent telephonist, we just had to send Ron Dunn for a look . . .

Turning a personal computer costing about four thousand dollars into a telephone answering machine might seem like a mindless activity — something like buying a new car and using it as a kennel for the family dog. After all, remote-playback answering machines with good functionality can now be purchased for under two hundred dollars, so why pay more?

The answers to the questions I initially framed when asked to review SAM (Smart Answering Machine) were soon forthcoming. This is not just an ordinary answering machine, but a complete telephone control system. The smartest move the developers of this package could do is to change its name.

SAM is a device allowing a personal computer to answer the telephone and take messages. Here, however, the resemblance to a standard answering machine stops. SAM also provides facilities to forward messages received, to page telephone users from a selected list, and to automatically place reminder calls. All facilities work (with minor limitations) to provide a complete communications base over the telephone network.

The SAM package tested was an early release, containing a printed circuit card, a diskette, a telephone handset, a telephone connect cable and a manual. The circuit card was a little messy, with many jumpers placed between components. Later releases of the product are much cleaner. Also supplied, but not part of the package, was a touch-tone beeper used for code access to the system (more later), which can be purchased from many consumer electronics stores.

SAM requires an IBM PC or true compatible, with one diskette drive and 192k of RAM. An additional diskette drive is useful for the storage of message text, as

digitized speech can consume considerable amounts of disk space.

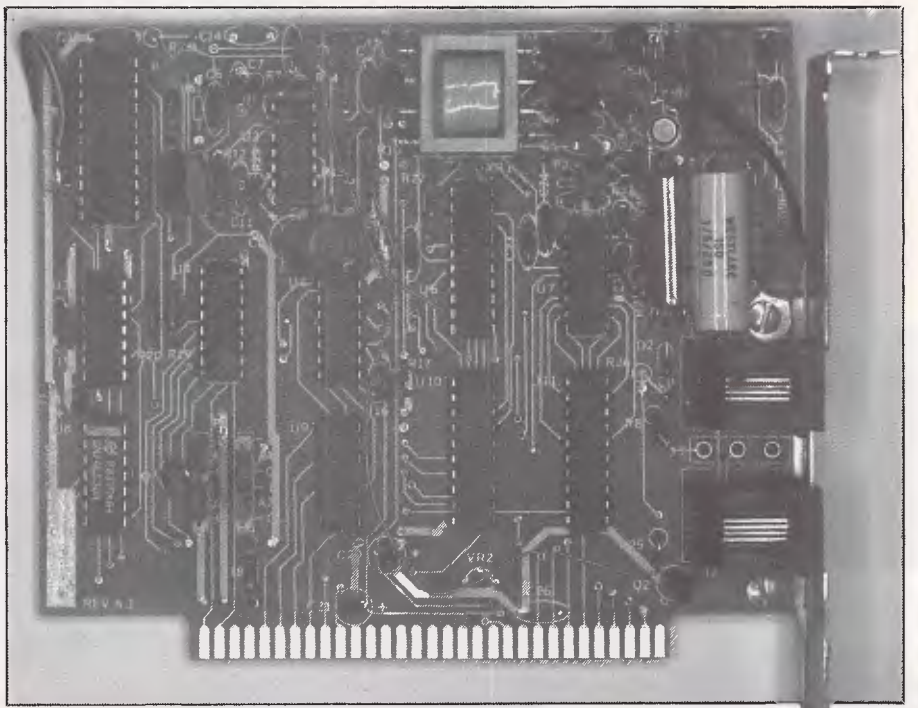
Installation

Installing SAM was a breeze. Off came the cover of the PC, and the SAM card was inserted in a short slot. The cover was replaced, and the two cables inserted in their labelled connectors. The installation instructions were thorough, with clear diagrams where necessary. The telephone handset was connected to one plug, and the other connected to the wall socket. When SAM is not operating, the telephone functions normally.

Starting up the SAM software was just as easy — a case of inserting the diskette supplied in the default drive and typing the command SAM, with the command menu rapidly displayed.

When SAM is first run, some options must be set to control normal operation of the system. These specify the length of message response that may be given by a caller, the remote access code for playback and other functions, the overflow disk drive for extended message storage, a pulse/tone dial switch, screen type switch, and a voice compression switch. Voice compression options are high or low, with high compression supposedly giving the worst quality text. Over a telephone I could not distinguish between the two, and both were better than my tape answering machine. High compression saves disk space on digitized speech.

The option settings are clearly documented, although hidden towards the rear of the manual. It would have been nice to see them up front, so all



We'll beat any price by \$10!

That's right, we guarantee the lowest prices around.

Tell us the advertiser and price of any software or hardware item on this page currently advertised in any popular computer publication and we'll beat that price by \$10.

This offer does not apply to items under \$100 or where the price is not lower than DataParts.

MONITOR SPECIALS

SAMPO HI RESOLUTION
Green Screen (inc cable) Suits most computers
\$169 (inc) Save \$60
Prod. No. A101

IBM-TAXAN COMPATIBLE

Green of Amber with TTL Resolution complete with PC type cable
\$249 (inc) Save \$110
Prod. No. A102

NEW COLOUR MONITOR

Ideal for Microbee, Commodore, Apple, BBC or AMSTRAD
\$399 (inc) Save \$100
Prod. No. A103

TAXAN VISION II



For the best resolution possible from your BBC or Apple
\$580 (inc) Save \$115
Prod. No. A104



TAXAN SUPER VISION III
(inc cables)
• Ideal for graphics and hi res—640 dots x 262 lines
• Faithful reproduction of intermediate colours
\$698 (inc) Save \$245
Prod. No. A105



TAXAN SUPER IV
• Super hi resolution graphics display for CAD and CAM
• Resolution 790 dots x 410 lines
Special S.P.O.A.
Prod. No. A106

PRINTER BARGAINS

OLYMPIC NLQ PRINTER
All electronic, touch button, high performance, dot matrix with single sheet or continuous feed
165 cps (90 cps NLQ) bi-directional. Epson and Centronic compatible with optional 2K buffer.
\$488 (inc) Save \$111
Prod. No. A107



EPSON GX 80

• Tractor-Friction feed
• 100 cps
• Near Letter Quality Switch
• Now fits Commodore Graphics, Apple II and IBM Graphix
Only \$489 (inc)
Prod. No. A108



EPSON RX 100 PRINTER

• Tractor-Frict on feed
• NLQ option
• 120 cps
• 15" carriage
• IBM compatible
\$698 (inc) Save \$120
Prod. No. A109



TAXAN SUPER PRINTER BUFFER

• The super buffer that never forgets. It comes standard with 64K memory and is expandable to 256K. Multi dual printer function switch. Copy, pause and reset functions. INCREDBLE VALUE—until stocks run out!
\$299 (inc) Save \$170
Prod. No. A111



OSBORNE ONE SPECIAL

64K CPU Dual Drive complete with all software.
• Some demo and second-hand models from **\$995 (inc)**
5 meg hard disk to suit
\$995 (inc)
Prod. No. A112A

OSBORNE EXECUTIVE

Complete with all software.
Only \$1495 (inc)
Prod. No. A112B

DISK DRIVES

BARGAINS GALORE
Bare drives for the hobbyist 2nd hand models
\$88 (inc)
Prod. No. A113A

NEW DRIVES

\$128 (inc)
Prod. No. A113B
SAVE SAVE SAVE

APPLE COMPATIBLE

New release Taiwanese drives
\$149 (inc) complete
Prod. No. A114A



OR HOW ABOUT THE BEST JAPANESE CHINON

\$218 (inc) complete
Prod. No. A114B

COMMODORE 1541 DRIVE PACKAGE

• Latest version complete with free library box of 10 diskettes
• And copy of SUPERFAST EASY SCRIP WORD PROCESSOR
\$349 (inc)
Prod. No. A115



QUALITY DRIVES BY MITSUBISHI

• High precision • High quality • High durability • You name it. Top range of disk drives ideal for use with TRS 80, Microbee, IBM, BBC, etc.
• Mitsubishi
—DSDD slimline drive—4853
\$169 (ex)
Prod. No. A116A
—DSDD slimline drive—4851—80 track 1 meg formatted
\$199 (ex)
Prod. No. A116B
—4854—80 track, 1.6 meg formatted
\$249 (ex)
Prod. No. A116C

VERBATIM DISKETTES

Prod. No. A118
10+ 100+
5 1/4" SSDD **\$2.98 \$2.68**
5 1/4" DSDD **\$3.88 \$2.98**
3 1/2" SSDD **\$6.98 \$5.98**
3 1/2" DSDD **\$7.98 \$6.98**

DISKETTES

DATAPART DISKETTES

• Lifetime Warranty
• Plastic Library Boxes
Prod. No. A117
10+ 100+ (inc tax)
SSDD **\$2.48 \$1.98**
DSDD **\$2.98 \$2.48**

BBC SPECIALS

3 1/2" 720K Drives for BBC or Electron
\$499 (inc)
Prod. No. A119

SOLIDISK FOR BBC

RAM expansion cords
64K = **\$139**
256K = **\$199**
Prod. No. A120

JOYSTICKS

All our new joysticks are designed around the famous American Kraft joystick.
Prod. No. A121

Commodore **\$29** each
Apple **\$39** each
BBC **\$39** each
IBM **\$49** each
All self-centering. High quality.

ADD ONS

STORAGE BOXES

• DX 85—stores 100 diskettes (with steel lock) **\$26.98 (inc)**
• DX 65 (with steel lock) **\$26.95 (inc)**
• DX 50—for 3 1/2" disks **\$34.50 (inc)**
• DX 50 w/o lock **\$14.95**
Prod. No. A122



APPLE OR IBM MOUSE

Includes software
IBM **\$135 (inc)**
Apple **\$99 (inc)**
Prod. No. A123

APPLE FANS

Plugs directly to side of Apple II, IIE and compatible. Save on costly repairs.
\$39.50
Prod. No. A124



SWIVEL BASE

Revolving Monitor Stand. Fits most monitors.
• Pan tilt revolving 360°
• High impact plastic
\$25
Prod. No. A125

"APPLE-TYPE" CARDS

While stocks last, so hurry! Order now.
• Apple-Type Mouse **\$99**
• Pal Colour Cards **\$59**
• Speech **\$49**
• Z-80/CP/M Cards **\$59**
• ICE Parallel Printer **\$95**
• ICE Serial Printer **\$95**
• Drive Card **\$58**
• IC Tester Card **\$98**
Prod. No. A126

PAPER COPY HOLDER

• Long neck
• Fully adjustable
\$29.95
Prod. No. A127



COMPONENTS

RAM	10+	100+
4116	\$1.49	\$1.29
4164/4864	\$1.69	\$1.49
41256	\$8.95	\$6.95
2114	\$1.49	\$1.29
6116	\$2.80	\$2.50

EPROMS

2732	\$5.50	\$4.80
2764	\$6.99	\$5.99
27128	\$10.95	\$9.65

Prod. No. A128

IBM-XT COMPATIBLE

10 MB Hard Disk
SPECIAL OFFER
PC Compatible
• 640K RAM
• Quality keyboard
• Colour output
• Includes hi res mono monitor
• 10 MB hard disk fitted
• New at Style Case
• Switchhold between 4.77 and 8 mg
\$2650 (inc)
Prod. No. A129



IBM COMPATIBLE CARDS

• Multifunctional 128K **\$299 (inc)**
• Multifunctional 384K **\$399 (inc)**
• 512K Memory Cards **\$275 (inc)**
• Colorgraphics Card **\$299 (inc)**
• Serial Async comms adaptor **\$99 (inc)**
• 64K ram kits 9 x 4164 ram **\$299 (inc)**
• Hard disk controller **\$99 (inc)**
SUPER SPECIAL
Hercules Graphix Compatible Card Complete
\$380 (inc)
Other Cards
S.P.O.A.
Prod. No. A130

Available from these outlets—

DataParts



TELEPHONE YOUR ORDER NOW

The best computer people in the country.

ALBURY: 518 Macauley Street (060) 21 8088
BALLARAT: 307 Mair Street (053) 31 3399
BENDIGO: 419 Hargreaves Street (054) 43 4866
CAMBERWELL: 519 Burke Road (03) 20 7897
SHEPPARTON: 11 Edward Street (058) 21 7155
WAGGA WAGGA: 33 Tompson Street (069) 21 6466

BANKCARD
ACCEPTED

FREE DELIVERY
ANYWHERE IN
AUSTRALIA
CALL NOW AND SAVE!
YOU WON'T BEAT
OUR PRICES!

DATAPARTS

Fully authorised IBM dealers. If you think these prices are competitive wait until you see what we can do with IBM PCs and other IBM products. Don't buy any IBM gear until you talk to DataParts. We've got the works, from complete systems to the widest range of IBM software and compatible products.

KINETIC SYSTEMS PTY LTD

357 Nicholson Street,
North Carlton, Victoria 3054
Telephone: (03) 347 7326, 347 7228. Telex: AA151986

<p>Olivetti M24 Single 360K Drive 20MB Internal Hard Disk Green Screen 128K RAM \$4,750.00</p>	<p>IBM AT 20MB Hard Disk 512K RAM 1.2MB Floppy Serial/Parallel Port \$10,140.00</p>	<p>IBM Dual Flo Taxan Gr 256K \$3,8</p>
--	---	---

<p>INTERNAL HARD DISKS</p>		
10MB Half Height	\$1,295	Wordstar 2000 +
20MB Half Height	\$1,795	Word Perfect
64K Memory	\$ 35	Flight Simulator
8087 Math Co-Processor 5MHz	\$ 275	Copywrite
8MHz	\$ 325	AST Six Pack with Sidek
<p>SOFTWARE</p>		Qubie Six Pack
Symphony	\$ 715	HARDWARE
Lotus 1,2,3	\$ 535	Qubie Monitor
dBase III	\$ 650	Colour Mono Taxan Vision IV

All prices subject to change. Payable by C

Olivetti M24

Dual 360K Drives
Green Screen
128K RAM
\$3,499.00

Olivetti M24

Single 360K Drive
10MB Internal Hard Disk
Green Screen
128K RAM
\$4,400.00

PC

by Drives
n Screen
emory
0.00

IBM PC

20MB Hard Disk
640K & Multifunction
Card
Taxan Green Screen
\$6,100.00

IBM Portable

10MB Hard Disk
512K Memory
\$5,495.00

\$ 495	Taxan Super Graphics Card	\$ 470
\$ 499	Roland Plotter DXY-880	\$1,599
\$ 75	DXY-980	\$2,099
\$ 95	Microsoft Mouse	\$ 240
\$ 510	AutoCad Version 2.1	
\$ 430	Standard	\$1,350
	ADE-2	\$2,650
	ADE-3	\$3,200
\$ 695	IRMA 3278 Board	\$1,899
\$ 245	Epson LQ-1500	\$1,795
\$ 849	Epson FX-100 +	\$1,015

que, Bankcard, Cash. Delivery costs extra.

the installation documentation was together.

Answering machine operation

The next step was to record a message so SAM would act as a standard answering machine. When a caller dialled in, it would play this message and wait for a response. A nice touch was the provision of a "disk full" message, to advise a caller that there was insufficient space to store their message. Messages were recorded and reviewed through the telephone handset. Messages are digitised and stored as standard disk files which are identified by a DOS file name selected to identify the type of message.

If SAM is now placed in answer mode it (I very nearly say "he" at this point), it will function as an answering machine. I

'All this is pretty ordinary stuff. SAM used as a standard answering machine is a waste.'

replaced my home device with SAM one day, and the only comments I received were on the improved tape quality. Messages received by SAM are filed on disk, for review or deletion.

All this is pretty ordinary stuff. SAM used as a standard answering machine is a waste. It is the functions described in the following sections that make this product interesting.

Call forwarding

The next option within the SAM package is call forwarding. This will allow you to play a message to callers advising that you are not available, and asking them to leave a message. SAM then dials a forwarding number, and plays the person answering the telephone a message of your choice. That person must then 'beep' a code over the telephone, and SAM will play the message.

This option worked well. SAM was set up to play a message advising callers that Ron Dunn was not at his desk, and that his computer would forward messages. The system then dialled the forwarding number with a message to the effect that Ron Dunn's computer was calling, and would they please call him to the telephone. The reaction of unsuspecting office staff was amusing — many would not believe that a PC was actually speaking over the telephone until shown SAM in operation.

There was some difficulty using SAM

in conjunction with office switchboards. Evidently SAM expects some line conditions that do not occur when a non-Telecom switchboard is used. This is particularly true of Commander telephone systems.

Personal messaging

The capacity exists within SAM to record personal messages, to be played to people beeping a private access code on calling. Up to 999 messages may theoretically be recorded, but disk space would limit this to less than one hundred in practical terms.

Callers requiring personal messages interrupt the standard greeting message with the '*' key on the beeper, and are prompted with a pre-recorded message to enter their access code. Once done, the message will be played twice, after which the caller is prompted to leave a response if required.

This function was used in a busy ten-person area for remote message retrieval. Users called in when free to retrieve any messages left for them at a central telephone point. Its operation was without fault.

Timed messages

This was the function of SAM that gave the most fun. The system allows the automatic dialling of a list of telephone numbers at a specified date and time, with the ability to record a response from the person called.

SAM was set to call a list of acquaintances at 3am, with a message requesting that they forget all thoughts of sleep, and telephone Run Dunn immediately. Responses were sought, but were not able to be printed in a magazine for public distribution. Needless to say SAM intercepted all response calls, leaving my sleep undisturbed.

SAM will try three calls to engaged or non-answered lines, at which point it will give up and log the event. This option sounds like a dream-come-true for direct marketing firms.

Phonebook operation

SAM can store up to 255 names and telephone numbers in an internal directory, with options to allow private use of the system and to create distribution lists for timed dialling.

The details recorded for each entry are the user name and telephone number, private use code, screening flag and distribution list code.

The private use code identifies those users that may interrupt the standard

greeting to retrieve personal messages.

The screening flag allows users flagged to interrupt the standard greeting, and keep the speaker on the computer. This allows the user to screen incoming calls, and only answer in person those with authorised access.

The distribution list code is used to identify which entries should be mass-dialled with a timed message. This allows selected groups of entries to be stored in the one file.

Remote operation

SAM allows remote operation for reviewing messages, recording new greetings, personal messages and forward messages, and for the entry of timed messages to a single number.

Operation of this feature is complex, relying on heavy usage of the beeper to select menu options.

Having a copy of the manual is a must for the operation of this function, and is not recommended for those with shaky hands.

Conclusion

Using SAM is a breeze. The menu structure is easy to follow, and all commands are prompted clearly. New users were able to master its use without the manual in most cases.

The documentation is clear, but I am slightly critical of its organisation. Perhaps a simple tutorial showing a setup of the system for normal usage would improve matters.

The caller functions of the system were a little more touchy. Not being able to use the system with some switchboards meant that forward and timed dialling numbers had to be carefully selected. The system also relied heavily on the tone-dial beeper for all functions other than straight message answering. These criticisms are not, however, sufficient to stop me praising the overall product.

Potential uses for SAM are many. Rural fire brigades could set SAM to call remote members in an emergency; public opinion polls could sample opinion with simple yes/no answers, workers operating away from the office could call at any time for new instructions, the list is endless with some imagination applied.

SAM costs \$1900.00. Given that it could be installed in a PC-clone costing less than \$2000.00, it represents excellent value for the communications facilities it offers.

SAM is distributed by Brainstorm Computer Products, telephone (02) 212 1622.

END

Introducing the Osborne College.

The most irresistible PC offer in this magazine. Only \$2,350.

Data Parts has done it again. now we can put you in front of the impressive new Osborne College PC with a bonus Hard Disk offer for just \$2,350. This 16 bit Pc is so compatible the manufacturer has had to obtain special approval to produce it. And it's so multifunctional it can stand alone or be linked to 255 other PC's with simple hi-fi jacks and cables, using the Osborne net card. But most of all it's a PC with Osborne reliability, Australia-wide service, and a commitment to growth.

EXCLUSIVE OFFER!

Save \$1,000*

*Offer available only to Osborne College purchasers.

Genuine Japanese quality hard disk drives by Mitsubishi.

10 Megabyte hard disk — \$899 complete or

20 Megabyte hard disk — \$1,199 complete.

These special prices include installation of hard disk and one disk drive only.

Osborne College PC works with

- Trans-Net Lan networks
 - Hercules boards
 - 3270 Emulation
 - Persyst monoboard and memory board
 - A.S.T. boards
 - All IBM boards
- and of course Data Parts own range of low cost boards. Also runs Lotus 1-2-3, Attache and other accounting software, Symphony, Wordstar 2000, Flight Simulator, dBase 111, Framework and Autocad 11, educational programs, etc. etc. Features: ● 1MB main memory ● Color graphics or mono text adaptor ● 8088 (4.77 MHz) Processor ● MSDOS (2.11) or PC DOS (2.10) ● Two 360 Kbyte 5¼" slimline drives ● 8 Expansive slots ● Runs Concurrent CP/M 86 and Concurrent PC DOS ● Will network with 255 other IBM College and compatibles ● Ideal Autocad computer ● Famous 6 months warranty nationwide by Hills Industries

Here's what you get for \$2,350

An Osborne College PC capable of running 1 MB on board plus ● Dual Drives ● Green Monitor (color or mono, parallel or serial ports) ● 1MB RAM ● DOS and Basic Software — Manuals and diskettes.

PLUS EXCLUSIVE HARD DISK OFFER!



MAIL ORDER NOW!

Call Direct! Call today!

11 Edward Street, Shepparton, Victoria, 3630. Telephone: (058) 21 7155

We deliver to your door anywhere in Australia. Only \$8 (Comet \$12)

This advertisement must be quoted to qualify for special prices.

TRADE ENQUIRIES WELCOME.

Cash, Cheques, Mastercard, Visa card and Bankcard accepted.

DataParts

The best computer people in the country.

ALBURY: 518 Macauley Street (060) 21 8088
 BALLARAT: 307 Mair Street (053) 31 3399
 BENDIGO: 419 Hargreaves Street (054) 43 4866
 CAMBERWELL: 519 Burke Road (03) 20 7897
 SHEPPARTON: 11 Edward Street (058) 21 7155
 WAGGA WAGGA: 33 Tompson Street (069) 21 6466



SAMNA's in Vogue

SAMNA WORD III SAMNA+

If you think keeping up with the latest fashion is hard work — you should try computers. For a start, word processors that only word-process are dead. The in-word today is office automation; individual personal computers doing a whole range of tasks. Word processing, project planning, spreadsheets, to name a few.

Byte Magazine (the computer industry guru) said "SAMNA Word III is the best..... I'd rather work with SAMNA Word III than with a dedicated word processor".

SAMNA Word III runs on the IBM Personal Computer* and lets you produce work you can be proud of. High quality, well-laid-out documents. Fast, easy to learn and simple to use. Just imagine, centering a title by using just 2 keys. Or being able to zoom out and look at a page even before its printed.

There's an Anglo English dictionary to help you with those difficult words; and your document index can be automatically produced. There's so many good things about SAMNA Word III, why not ask for a demo at your local computer store, or complete the clip coupon below.

ARCOM Pacific is the leading business micro computer software distributor in Australia and New Zealand. We'll help you stay in touch with computers.

For an even more versatile office tool, **SAMNA+** integrates multiple spreadsheets with SAMNA Word III. Gareth Powell, Computer Editor, Sydney Morning Herald said, "In a sense SAMNA+ rivals Lotus 1-2-3..... it includes a database of sorts plus spreadsheets. The great difference is that it has been designed principally for people who manipulate words".

This means you can use your word processing skills to layout and manipulate the spreadsheet. Multiple spreadsheets can easily be handled and wide documents can be folded to compare different columns of numbers. Furthermore, results in a table can automatically update conclusions in the text.

The Word Base Manager in SAMNA+ gives you the ability to search many or all of your documents for specific information, e.g. find a letter sent to a client some weeks ago, or list all the references to a specific subject. It is an incredibly powerful facility, only seeing is believing. Why not ask for a demonstration at your local computer store, or use the clip coupon below.

*SAMNA Word III and SAMNA+ work on the IBM PC, PC-XT, AT, PC 3270 and close compatibles.

Please send me details about SAMNA Word III & SAMNA+

Name _____

Address _____

Post to: FREEPOST 2,
ARCOM PACIFIC
P.O. Box 13,
Clayfield,
Q. 4011

arcom pacific
■ master distributor ■

SUBSCRIPTION ORDER FORM



I would like to subscribe to *APC* and receive a free binder

- This is a new subscription
 This is a renewal

- 1 year (12 issues) Aust. \$35
 1 year rest of the world (12 issues) Aust. \$60 surface mail
 2 years (24 issues) Aust. \$65
 3 years (36 issues) Aust. \$90

- I enclose my cheque, made payable to *Australian Personal Computer* for \$ _____
 Please debit my American Express/Bank Card/Visa (delete where not applicable).

Account No: _____ Expiry Date: _____

Signed: _____ Name: _____

Address: _____

Post code _____

BACK ISSUES ORDER FORM

Please supply the following back issues:

- | | | | | | | | | | | | | | | | | | | | |
|------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--|--|--|--|--|--|--|
| Vol. 2 No. | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | | | | | | | | | | | | | | | | | |
| Vol. 3 No. | <input type="checkbox"/> 2 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | <input type="checkbox"/> 9 | <input type="checkbox"/> 10 | <input type="checkbox"/> 11 | <input type="checkbox"/> 12 | | | | | | | | | | |
| Vol. 4 No. | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 8 | <input type="checkbox"/> 9 | <input type="checkbox"/> 10 | <input type="checkbox"/> 11 | <input type="checkbox"/> 12 | | | | | | | | | | | | |
| Vol. 5 No. | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | <input type="checkbox"/> 8 | <input type="checkbox"/> 9 | <input type="checkbox"/> 10 | <input type="checkbox"/> 11 | <input type="checkbox"/> 12 | | | | | | | |
| Vol. 6 No. | <input type="checkbox"/> 1 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | <input type="checkbox"/> 8 | <input type="checkbox"/> 9 | <input type="checkbox"/> 10 | <input type="checkbox"/> 11 | <input type="checkbox"/> 12 | | | | | | | | |

Volumes not listed are no longer available. Please check carefully and use block letters when ordering.

Any one issue \$4.50; any two issues \$8.70; any three issues \$12.70; any four issues \$16.40; further issues \$3.50 each. Prices include post and packing.

- I enclose my cheque, made payable to *Australian Personal Computer* for \$ _____
 Please debit my American Express/Bank Card/Visa (delete where not applicable).

Account No: _____ Expiry Date: _____

Signed: _____ Name: _____

Address: _____

Post code _____

Subscription to Microtex 666

See *Microtex 666* advertisement in this magazine

I want to become a member of *Microtex 666*

- Enclosed is my cheque or money order, made payable to *Microtex 666* for \$49.95

- Please debit my credit card \$49.95
 All major credit cards and Bankcard accepted.

Note: your credit card will be debited to *Australian Consolidated Press*

Account Number: _____

Signature _____ Expiry Date _____

Name _____

Address _____

Post code _____

Telephone: _____

Microtex 666 Viatel Package for Commodore 64

Includes *Microtex 666* Subscription
 See *Information Solutions* advertisement in this magazine

- Please send me the *Microtex 666 Viatel* package for the:
- | | |
|-----------------------------------|----------|
| Commodore 64 with 1541 Disk Drive | \$399.00 |
| Commodore 64 with Skai Disk Drive | \$399.00 |
| Commodore 64 with MSD Disk Drive | \$399.00 |
| Commodore 64 with 4040 Disk Drive | \$399.00 |
| Commodore 64 with Tape | \$399.00 |

Prices include tax. Packing and shipping incl.

- Enclosed is my cheque or money order, made payable to *Information Solutions* for \$399.00

- Please debit my credit card \$399.00
 All major credit cards and Bankcard accepted.

Note: your credit card will be debited to *Information Solutions*

Account Number: _____

Signature _____ Expiry Date _____

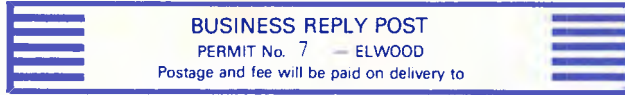
Name _____

Address _____

Post code _____

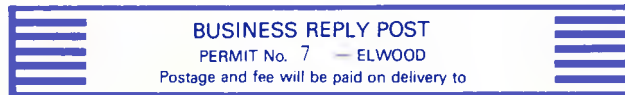
Telephone: _____

No postage stamp required
if posted in Australia



Australian Personal Computer
77 Glenhuntly Road,
Elwood, Vic. 3184

No postage stamp required
if posted in Australia



Australian Personal Computer
77 Glenhuntly Road,
Elwood, Vic. 3184

Affix
Stamp
Here

Microtex 666
PO Box 666
Fitzroy
Victoria 3065

INVESTMENT OPPORTUNITY

Why leave your savings moulding away in a bank's savings account earning 8% or 9% when you can cop a staggering 47% by subscribing to **APC**?

Sounds incredible, doesn't it! But by sending us your cash, you'll save \$7 off the next 12 month's newstand price when **APC**'s cover price shoots up to \$3.50. So how much would you expect to pay?

Don't answer — 'cause we'll also throw in a super-sturdy binder built to handle the stress of accommodating a full year's issues of **APC**. The binder alone normally sells for \$9.50.

Now, how much would you expect to pay for 12 months of **APC** at an annual saving of \$7 and a free blue binder with **APC** logo emblazoned across the front?

Don't answer yet, because we'll even throw in free postage and wrapping. So, how much would you expect to invest. Remember, you get 12 issues of Australia's top-selling computer magazine; a sturdy blue binder, free wrapping and postage for all 12 issues of **APC** and the binder, **PLUS** a saving of \$7 off the newstand price. All this would normally cost \$51.50.



Would you pay \$45? What about \$42? Of course you would! Well, how about \$39.99? But our price is only \$35!

That's right — send only \$35. And that's a return of 46% on your money. Hey, hey — this sounds too good to be true. But it is (true)! **AND**, because of the way our accountants will structure your investment, you won't pay one cent in tax.

Don't delay — fill in the card opposite.
We'll **even** pay its postage. Offer closes March 28.

Suicide chess

Keen computer chess player John White set himself a programming challenge with his chess program, *Nega-querq*: the objective being to lose all his pieces as quickly as possible. Here he describes the programming techniques he used.

Suicide chess (SCC) is a well-known variant of chess which has, however, been little explored by computer chess programmers. My own interest in SCC began when I started a practice of playing against opponents who had just beaten me at ordinary chess, with the joking remark that 'I ought to be good at it.' Alas, I played suicide chess rather too often while my opponents played it only against me, with the result that I nearly always won, which in turn increased my interest in the game.

There seem to be several different rules for playing SCC, so some standard rules will need to be enunciated. SCC is played with the same rules as chess with the following exceptions:

- 1) The objective of the game is to lose all your pieces.
- 2) The king has no special value and can be captured at any time. There is no 'check'.
- 3) Pieces offered for capture must be taken. If a choice exists of pieces to be captured, the player can decide which to take.
- 4) If the player to move has no legal moves left, but does have pieces remaining (that is, one or more blocked pawns), the game is drawn by stalemate.
- 5) There are no 'double moves' — that is, no castling or *en passant*.
- 6) Pawn promotion is invariably to a queen.

These rules make SCC much easier to program than ordinary chess, and the game is well suited to anyone proposing to write their first chess program. I adopted a different route, taking one of my commercial chess programs and stripping out all the check routines and dou-

ble moves, adapting the move generator to force the program to make captures and altering the evaluation function. Obviously, the end result is less efficient than a custom-designed program, but it did enable me to directly compare the speed of the finished product with that of a standard chess program.

Evaluation function

The first point to consider, when writing a suicide chess program, is the value of the pieces. The normal value for chess pieces is shown in Fig 1, along with the values which I have somewhat arbitrarily adopted for my SCC program. Experience soon shows that the rook and the bishop are devastating pieces in the mid game, once they become active, permitting the opponent to line up his own pieces to be mown down one after another.

The queen, with its wide range of moves, is more easy to dispose of in mid game (but much less so in the ending), while the king, with its limited range, is a player's best piece since it can easily be lost while having little propensity itself to take the opponent's men.

Every chess programmer knows that mobility is the next most important consideration after material. Even now, I am unable to decide how valuable mobility is in SCC. On the one hand, increased mobility enables the program to get its pieces out quickly to dispose of them; on the other, high mobility may unleash all its pieces onto its opponent's men so that he loses his entire force instead. Mobility, then, cannot be simply ignored but is probably of positive benefit early in



the game and negative benefit when few pieces remain. My own program keeps mobility as a positive factor throughout the game.

Very few other evaluation features are necessary. Pawns play an important role in SCC, since an overwhelming advantage can be lost if the last man is a pawn which the other side can blockade;



worse, pawns can only relentlessly advance to become queens. Thus any position where the program finds that it has only pawns remaining is subjected to a very high penalty.

Pawn structure is examined for the presence of isolated, doubled and trebled pawns. These are scored exactly the same way that they would be for a

normal chess program. Finally, when little material remains on the board, the queen becomes much more dangerous to the side which owns it, and therefore the value of a queen is increased to seven units (the same as a rook) when only 15 pieces remain on the board.

A small random number is added into the evaluation function, in order to vary

the play from game to game.

Search in depth

The operating system for an SCC program can be almost identical to that of an ordinary chess program, if the piece values given in Fig 1 are stored in their complementary form; that is, a rook is



ATLANTIS INTERNATIONAL COMPUTERS

IMPORTERS
SUPPLIERS
DISTRIBUTORS
& SALES

49 WADHAM PARADE, MT. WAVERLEY, VIC. 3149
PHONE: 277 3139, 277 7187, 277 9514



ATLANTIS PC 256K RAM (EXPANDABLE TO 640K) 8088 PROCESSOR

- 2 x TEAC (JAPANESE) DISK DRIVES
- 1 x MULTIFUNCTION CARD
- 1 x SERIAL PORT
- 1 x CENTRONICS PORT
- 1 x JOYSTICK PORT
- 1 x COLOR GRAPHICS CARD
- 1 x RGB PORT
- 2 x COMPOSITE PORTS
- CLOCK/CALENDAR

EX-STOCK
ATLANTIC PC/XT

\$1645

EX-TAX

TOTAL PRICE

IBM COMPATIBLE PC/XT 640K RAM

SPECIALS

MONITORS

TAXAN-COMPOSITE MONITOR	\$180
TAXAN TTL ORANGE	\$229
TAXAN TTL GREEN	\$229
TAXAN SUPER VISION 3	\$699
ROLAND COMPOSITE	\$199
MONITOR CABLE	\$29
MONITOR STANDS	\$29
ROLAND COLOUR MONITOR	\$899
ATLANTIS D+X2001	\$599

HARD DISK

20MG AND CONTROLLER	\$1500
10MG AND CONTROLLER	\$1050
Installed free	

INTERFACE FOR IBM OR COMPATIBLES

MULTIFUNCTION CARD 384K/OK	\$202
MEMORY CARD 0 TO 1MG	\$99
MONO GRAPHIC (HERCULES) CARD	\$202
COLOUR GRAPHIC (IBM)	\$159
MODULAR GRAPHIC (PARADISE)	\$325
PARALLEL INTERFACE	\$65
SERIAL INTERFACE	\$79
DISK DRIVE CARD	\$86
DISK DRIVE CABLE FOR ABOVE	\$25
DISK/MULTI IO CARD	\$209
CABLE FOR ABOVE	\$25
HARD DISK CONTROLLER	\$318
IBM DISK DRIVE SANYO OR TEAC	\$229
JOY STICK	\$45
PRINTER CABLE	\$29
REPLACEMENT KEYBOARD	\$150
REPLACEMENT KEYBOARD (KETRONIC)	\$239
PC SUPER MODEM 1200/75 300	\$239
MODEM PHONE WITH VIATEL AND SOFTWARE	\$279

TAX PAID

2000 SHEETS OF PAPER	\$38
PRINTERS GALORE	
SUPER 5 EP 1201	\$479
SUPER 5 EP 1802	\$699
CPB 80 130 CPS	\$395
CPB-136P 130 CPS 15 INCH	\$799

★ For your printer requirement, ring.
A.I.C. will match or beat any price
on printers in this issue

8087 CO-PROCESSOR

\$269

LIMITED
QUANTITY

FREE-FREE-FREE-FREE-FREE
LOG ON TO OUR RBBS
24 HOURS FREE. PH 277 6824

- NOTE:**
- DEALER ENQUIRIES WELCOME ● DELIVERY EXTRA ● ALL PRICES INCLUDE SALES TAX
 - ATLANTIS INTERNATIONAL ARE LOOKING FOR NEW DEALERS INTERSTATE
 - A.I.C. ACCEPTS BANKCARD, VISA, AND CHEQUES
 - PLEASE ALLOW 3 OR 4 DAYS DELIVERY

PROGRAMMING

stored as -7, a king as -1, and so on. A deep search which incorporates iterative deepening and alpha-beta pruning is perfectly acceptable. However, the alpha-beta window is quite useless. The window is ordinarily used in chess programs where it is assumed that no sequence of moves will result in a large alteration in the material situation. In these circumstances, the window is beneficial. In an SCC game, the amount of material is likely to alter drastically through a forced sequence of moves, and the alpha-beta window must therefore not be used.

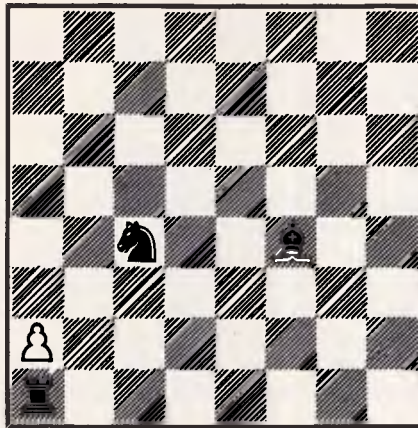
A very important feature of an operating system for playing SCC is the 'Chopper' device, also used in ordinary chess programs. When a program has only one legal move at its disposal, Chopper forces the move to be played at once without searching in depth to consider the consequences. SCC games very often involve forced captures where only one legal capture exists. Therefore, Chopper is an indispensable feature of an SCC program, frequently forcing the program to make virtually instant moves and leaving more time for more complex positions.

Because the most important feature of SCC is simply the material count, a TECH-type program is probably the best implementation. This is the name given to the process whereby the computer's moves are ordered on the basis of positional factors at the lowest depth of search, and then the order of moves is altered only where a deep search results in a change of material.

Captures are examined to greater depth than the rest of the search. Unresolved captures at some maximum depth are handled by a modified 'swap-off' algorithm. In ordinary chess programs, the algorithm gives an estimate of the value of a series of exchanges on a square attacked by pieces of both sides, where either side can terminate the exchange sequence whenever it is most favourable. In the case of SCC, no termination is permitted until all the pieces have been exchanged, so the algorithm is modified essentially to decide which side has lost the most pieces on that square — the route is evaluated only when the attacked square is occupied.

It could be argued that a 'threat detector' would be a useful addition to an SCC program. This searches any line which ends with a capture to see if the opponent can give away another piece with a non-capturing move.

The main difficulty with an SCC program which incorporates a threat detector occurs principally in the opening. So very many lines become searched in response to potential threats that the base



White is to move

search depth rarely has time to exceed three ply, assuming a 20-second search time and that forcing lines are searched to a maximum further depth of four extra ply.

In the later stages of the game, there are fewer forcing lines with threats, and the search time more closely approximates to that of the ordinary SCC program (the chessboard illustrates the differences).

White is to move, and the winning line is F4-D2; C4xD2; A1-B1; D2xB1; A2-A3; B1xA3. This requires a six-ply search. The ordinary program examines the move F4-E5, the reason being that white does *not* want to lose both the bishop and the rook which leaves a sole pawn.

Such a result is heavily penalised and black would almost certainly win the black knight versus white pawn ending

Piece	Chess	SCC
King	255	1
Queen	9	2
Rook	5	7
Bishop	3	5
Knight	3	4
Pawn	1	3

Fig 1 Values for chess pieces

which would follow. If white began with F4-E3 or F4-D2, it would also have to give up the rook to avoid the knight sacrificing itself and winning the game for black.

Thus, the ordinary program requires a full search of six ply to find the winning continuation. However, an SCC program with threat detection, capable of searching threats to a maximum further depth of four ply, will find the winning line from a nominal search of just two plylooks ahead. The second of these two moves is a capture, so the program looks one ply further ahead to see if white can give away another piece. White can, and so the program looks another ply ahead. This move is a capture, so the process is repeated up to the maximum depth of six ply, sufficient to discover the winning line.

On balance, a program with the ability to detect and analyse threats is probably superior to the ordinary program (which only looks ahead when captures are involved), apart from its excruciating slowness in the opening moves. The solution is to provide an SCC program with a book opening library to play these moves.



BANX

Book openings

A number of book openings should be provided for an SCC program. Left to its own devices, my program will always open with C2-C3, as this move increases mobility without enabling black to give any pieces away. In fact, opening moves of D2-D4 and E2-E4 are generally much superior despite the fact that black can give away two pawns on each, since these openings permit white to quickly dispose of some of his most dangerous and active pieces. Unfortunately, the problem is compounded by the fact that some very nasty forcing lines exist for

'The first thing which strikes anyone who plays (or programs) SCC is the game's similarity to draughts.'

black which come close to refuting these opening moves for white.

Two very trappy opening lines showing perhaps the best play for both sides are the following:

1) E2E4 F7F5 E4F5 B7B5 F1B5 E7E6

and now white has the options of the horrible B5D7 B8D7 F5E6, or the appalling F5E6 D7E6 B5E8 D8D2 D1D2 B8C6, and so on.

2) D2D4 G7G5 C1G5 E7E5 when white must play D4E5 to avoid disaster.

It may be that other opening lines prove to be better. It is possible to use an SCC program to determine the best sequence for both sides by a very deep calculation. Although this will take a long time, once discovered the moves can be incorporated into the program's book. This method was used to find some of the opening lines for my own program.

Type of play

The first thing which strikes anyone who plays (or programs) SCC is the game's similarity to draughts. Apart from the moves, SCC has much more in common with draughts than with chess. The forced play caused by the need to accept captures makes many lines very fast indeed, and a search depth to six to seven ply at a time setting of only 20 seconds per move is quite common. By contrast, an ordinary chess program will not normally exceed three ply at this speed.

The presence of the Chopper mechanism means that time control is somewhat erratic. A program nominally set to play at the rate of 20 seconds per move may, in mid game, make every other move instantly so that the total time consumed averages much less than 20 seconds per move. Again, forcing sequences from one position may enable the program to reach seven ply within 10 seconds, while another position, with fewer forcing sequences, may take 40 seconds to reach five ply.

Do these deep searches, reaching eight to 10 ply at two minutes per move, mean that SCC programs are unbeatable? The answer is no, since many forced sequences are so very long that the program cannot see the end of them either: it may enter a very long sequence which has a disastrous outcome after a non-forcing move.

Readers wishing to explore this topic further are invited to turn to the regular Microchess column in End Zone, where two games from John White's Negaquerg program are shown.

END

Sell your software product on the U.S. market.

Our client StarCard Australia Pty. Ltd. has engaged us to assist in procuring software for the U.S. market.

StarCard is an Australian Company with established access to the lucrative U.S. Personal Computer market through their San Francisco office.

They develop their own software, and have considerable experience in Program marketing in the U.S., where they have product distribution in over 8000 shopfronts. Active links with major U.S. distributors are maintained.

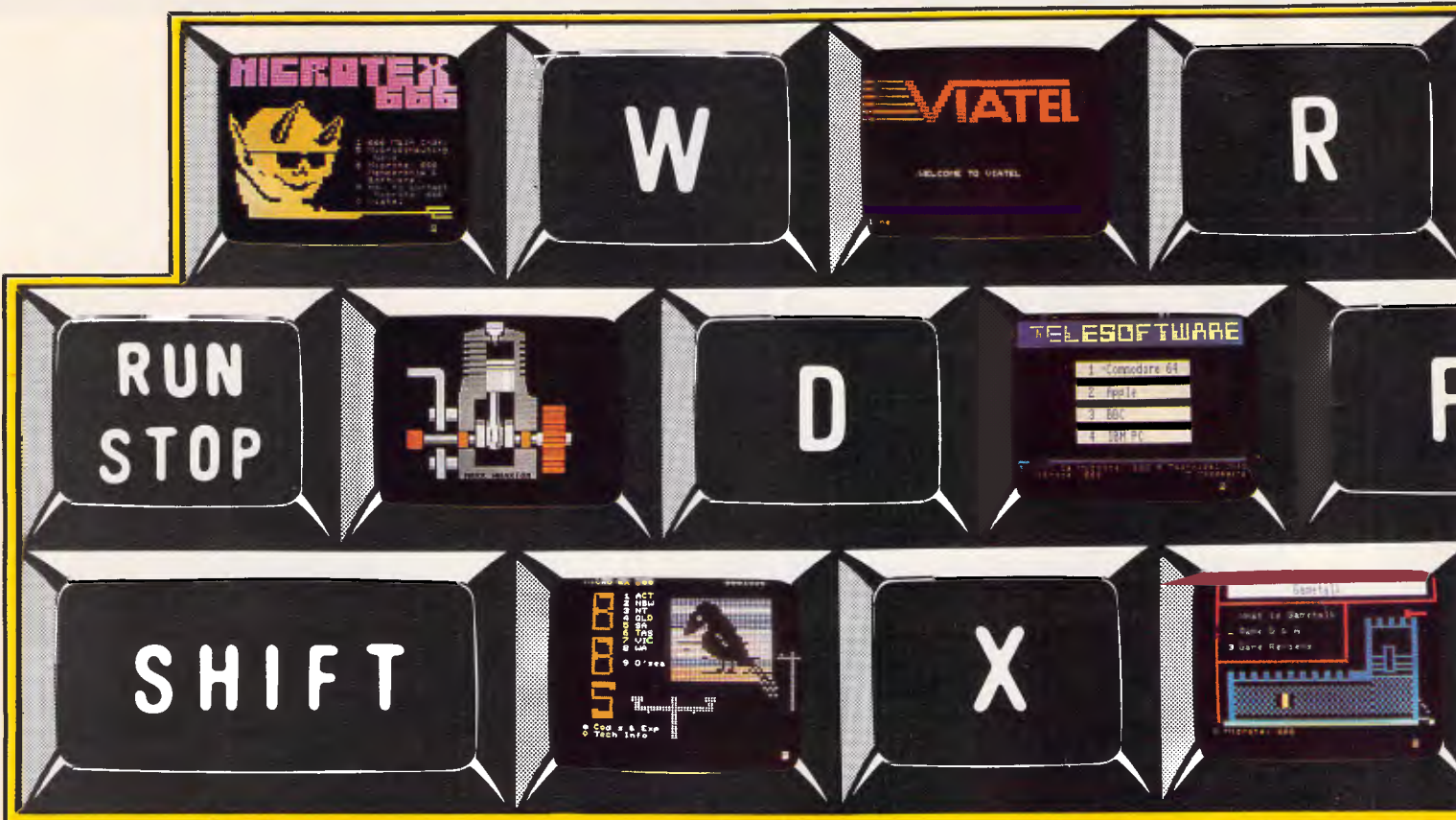
If you have a software product which you think may have U.S. market potential, then you should contact us. StarCard will expertly evaluate

products for:

- Accounting • Word Processing • Education
- Typing Tuition • Adventure Games • Statistics
- Spread Sheets • Database • Desktop Utilities
- Compilers • Screen Painters • And any other you may have developed.
- Submissions should be compatible with IBM P.C. or MacIntosh.
- Your enquiry and product will be treated with the strictest confidence, and an initial evaluation of your product's potential in the U.S. will be prepared within 10 days of receipt.
- Software accepted by StarCard is *guaranteed* access and active distribution to the U.S. markets.

**Ring Sydney (02) 290 3655 in the first instance or forward information to
Ron Pollak and Co., 146 Sussex St., Sydney, 2000.**

STARCARD



Key into the age of Videotex

Buy a modem, join Viatel®, subscribe to node 666 (\$49.95 p.a.) and suddenly your computing experience enters a refreshingly unfamiliar dimension. On Microtex 666 you will be accessing a living network:

Telesoftware Library — the distinguishing feature of the database from which you can download programs via the telephone line into your computer and straight onto disk or tape. A growing selection of software is now available for downloading to Commodore 64, IBM PC, Apple and BBC computers. A tide of additional programs is on its way.

Blackboard — the first automatically updatable bulletin board on Viatel — runs live during peak usage periods. Enter at your own risk.

Great Galactic Conflict — one hell of a game for up to 1000 players; tests your wit, diplomacy and deception to the hilt — not to be missed! \$5000 cash price.

Tips & Hints — a growing selection of useful suggestions and utilities to help maximize the potential of your computer.

Trading Post — a commodity exchange on which you can list any product, wanted or for sale.

Questions & Answers — an excellent way of solving computer related problems. Send a question and other members will respond with answers.

Bulletin Board Listings — an index of Australian and overseas bulletin boards with telephone numbers for each.

Electronic mail — a personal mail and telex service for all users. Messages can be sent from user to user, and telexes to any location in Australia.

Gametalk — a section devoted entirely to discussion and problem solving in games. For instance, if you're inescapably stuck in a coffin, under a bridge, in a black hole or any other uncompromising position in a game, just send a question and you are likely to receive an answer within 24 hours. Also, there are games reviews to guide your purchasing and a Top 20 of the most popular games.

User Group Board — a comprehensive listing of Australian computer user groups. All user groups are invited to use this section as a notice board to publicize meeting dates, location, agenda and joining details, and to get the club known generally.

Magazine — as a project of Computer Publications (publisher of 'Australian Personal Computer' & 'Personal Computer Games'), Microtex 666 provides APC and PCG programs and a way of subscribing to each. Order back issues as well as up-to-date news section sourced from APC, PCG and the new weekly, 'Computing Australia'.

Send further details about Microtex 666

Name: _____

Address: _____

Make/Model of Micro: _____

P'Code _____ Tel: _____

Microtex 666:

31 Victoria Street, P.O. Box 666,
Fitzroy, Victoria 3065. Phone (03) 419 0666

Innovation '86

Ever thought that a PC needed something it didn't have? Ever wished that an IBM had an IEEE output, or that your Olivetti could understand every word you said?

Now, APC and Dick Smith Electronics are offering big prizes for big ideas, however small the start. And, alongside the big prizes, there is the chance to see your name in lights as the designer of an innovative product.

The winner of Class 1 will be awarded the first prize of a fully-blown Olivetti M24 system.

Prizes for winners in Class II and III will receive a Data Products Printer and \$500 worth of software respectively. The whole object of the competition is to dredge the Australian PC fraternity for good ideas from which products can be made; so finalists in *each* category will have the opportunity of discussing their idea or product with an Australian development company, if they chose. Even if an idea isn't the winner, it may still become a winner in a commercial sense making profits for its originator.

Class 1 — Ready to Run

The top awards will go to ideas that have been pushed the closest to reality. Entries will be judged on a combination of innovation and production feasibility, and the idea presented should be as close to a working example as possible.

Comprehensive documentation and diagrams are expected as standard, and working examples, whether in breadboard or prototype form, would be an added bonus.

The winner in Class 1 will receive Olivetti's PC-compatible M24, equipped with a 20Mb hard disk. The M24 is known as one of the best, if not *the* best PC-compatible on the market. It boasts superb engineering, an ultra-fast processor and a display screen with resolution equal to Apple's Macintosh; and, of course, there's the security a big-name manufacturer in Olivetti and Australia-wide support through Dick Smith Electronics.

HOW TO ENTER: Submit your entry to Innovation '86, C/- Australian Personal Computer, 2nd floor, 215 Clarence Street, Sydney, NSW 2000.

ENTRY FORM

THE DICK SMITH ELECTRONICS/AUSTRALIAN
PERSONAL COMPUTER INNOVATION '86

COMPETITION ENTRY

ENTRANT'S NAME

ADDRESS

.....

.....

TELEPHONE

I want to enter my idea into the:

CLASS I READY TO RUN ()

CLASS II A GREAT IDEA ()

CLASS III ACADEMIC ENTRY ()

IDEA DESCRIPTION:

.....

.....

FURTHER DETAILS PROVIDED BY:

ITEM 1

ITEM 2

ITEM 3

ITEM 4

ITEM 5

ITEM 6

PLEASE MARK ALL ITEMS CLEARLY WITH YOUR
ENTRANT NAME AND ITEM NUMBER.

To the best of my knowledge and belief, the idea/
product described above is not in production
anywhere in the world.

Signed Date

The Entrant

*Failure to sign excludes entry from the
competition.*



Pictured above is the Olivetti M24 with a dual floppy disk drive. The lucky first prize winner will actually receive an Olivetti M24 with a 20Mbyte hard disk system valued at \$6795 from Olivetti.



The winner in this class will receive a Data Products 8012 dot matrix printer from Dick Smith Electronics. The printer is valued at \$995.

Class II — A Great Idea

Entries in this class will be judged on sheer innovation. Presentation of the idea need not be of the highest standard, and there do not need to be any prototypes or breadboards.

But the projected product must be feasible, and the idea must show some signs, however slight, of possible practical implementation. We would like to upgrade our PCs to 640k for \$12.50, but unless you can demonstrate a product that can do it at that price, the idea alone is not good enough.

The winner in this class will receive a Data Products 8012 dot matrix printer from Dick Smith Electronics. The printer is valued at \$995, and has three operating modes: draft mode (180 cps), medium (80 cps) and Near Letter Quality (30 cps). The printer will support standard IBM PC and compatible business applications including graphics and spreadsheets.

Class III — The Academic Team Prize

Here is where a team can enter. The winning project from a school, college or university, along the lines already described, will win a choice of \$500 worth of software from Imagineering, Australia's leading microcomputer software distributor.

The Rules

- 1) The competition is open to anyone, except as detailed in Rule 5, as an individual. In the case of minors under 18, all competition entries and communication with the competition organisers must be through a legally-recognised parent or guardian.
- 2) Competition entries can be submitted in any form whatsoever, bearing in mind the objectives of the competition.
- 3) A competitor may enter as many different ideas as he or she desires.
- 4) Entries will close on March 31, 1986, with the winners to be announced in the May issue of APC.
- 5) Employees of Computer Publications or Dick Smith Electronics, and their principals and agents, are barred from competing.
- 6) The judges' decision is final, and no correspondence with the judging panel is permitted other than the submission of the entry.
- 7) Ideas and products currently in production anywhere in the world will be excluded from the competition.



**DICK SMITH
ELECTRONICS**

olivetti



IMAGINEERING
"The Art of Software"



Out of the arcade and into futuristic football, Stephen Applebaum finds a cure for a bad case of hacking. All this and more in this month's horde of games for the Commodore 64/128, Spectrum, Amstrad, Apple and Atari.



Forbidden fruits

GAME: Hacker

MACHINE: Commodore 64/128
Apple II, Macintosh,
Atari, Amstrad

SUPPLIER: Imagineering

PRICE: \$19.95, 34.95 (C64),
\$39.95 (Apple II series,
Macintosh), \$34.95
(Atari), \$19.95
(Amstrad)



Hacker is a type of placebo for frustrated computer crackers who can't get the hacking bug out of their system. Instead of weaning hackers off their vice, Activision's game simulates a simple computer for the player to break into the impunity. Although nowhere near as difficult to enter as a real-life computer of equivalent size, Hacker's mainframe poses enough problems to keep players sweating for a while.

To give its game an air of complicity, Activision has taken the radical step of not including any instructions, apart from those outlining how to load the program. What information you are given is self-evident scene setting, so you go into the game blind, not knowing what your

aim is or how to achieve it.

Without giving too much away, Hacker features a large corporation that's holding the world to ransom by threatening to detonate a massive nuclear warhead at an undisclosed location. Washington knows that something is afoot but is unable to take steps without knowing who the instigators are.

Incredibly, the computer into which you've hacked is owned by the perpetrators of the crime, so it's up to you to gather together enough information to avert the impending disaster. There is more, but that would take all the fun away from this extraordinary game.

Hacker is a superb little game with excellent graphics and superb sound effects. Interestingly, Activision makes no claims about it being a simulation of the real thing, so clearing itself of being accused of condoning hacking which is, after all, a criminal offence. On the other hand, it also fails to rebuke it.

Hacker is a program for games players of all tastes. There are many twists and some truly exciting moments. I'd recommend it to hackers especially, as it's one of the only ways to practise your technique without running the risk of having the full weight of the judicial system come crashing down on your head.

Double-take

GAME: Fighting Warrior

MACHINE: Commodore 64,
Amstrad, Spectrum

SUPPLIER: Melbourne House

PRICE: \$24.95 (c)

Fighting Warrior comes from the same stable as the superb Way Of The Exploding Fist, and contains many of the features that made the latter such an unrivalled success. Disappointingly, though, even with such a distinguished pedigree, Fighting Warrior still bears an



uncanny resemblance to Karateka (reviewed last month).

The scenario, for instance, is almost identical, except that the evil warlord is



now a pharaoh, and the mountain palace a temple; only the kidnapped princess remains the same. So much for originality.

Below Fighting Warrior's hackneyed exterior lurks a game of extreme violence. Similar in style to Karateka, Fighting Warrior features two characters locked in mortal combat. One is your man, the other is one of the pharaoh's minions. This time there are no subtleties imposed by ritualised fighting methods, only the mindless cut and thrust of swords.

During combat, both your strength and that of your opponent is indicated by a line of arrows along the bottom of the screen. As the battle wends its fatal

course, the lines steadily recede until one or the other drops dead under the barrage of blows.

If you are the victor, you must run towards the pharaoh's temple. On the way you'll find magic objects that will help you against the foe, but beware — some are evil in disguise.

Fighting Warrior is as good as, if not better than the Spectrum version of Way Of The Exploding Fist. The characters aren't as agile, but the actions they perform are smooth and untainted by flickering. The detail that has gone into

some of the characters is incredible. For example, one of the evil hordes, a dragon-like man, wraps its wings around itself, protecting it from your pathetic blows. Then, as if from nowhere, its legs come flying at you, sapping your strength and taking you ever nearer the blow that will finally despatch you.

Fighting Warrior is a must. Not only is it a marvellous game, it is also a good example of what can be achieved on the humble home computer.



Here we go again

GAME: Archon II

MACHINE: Commodore 64/128
Atari, Apple, IBM

SUPPLIER: ECP

PRICE: \$39.95 (C64, Apple, Atari) \$49.95 (IBM)

If nothing else, 1985 could become the

year of the sequel. I've lost count of the number of times that I've had to write: 'Such-and-such is the follow-up to...' I have to say it again here because Archon II is the follow-up to Archon and, in fact, to a great extent, is a rehash of old material.

Although it tries very hard to be different, Archon II is just Archon with pretty backgrounds. There is a slight difference in strategy, but not enough to attract players of the original. Newcomers, on the other hand, should find it

a fascinating blend of strategy and arcade action.

Archon II centres around the age-old battle between good and evil, or, in this case, order and chaos. Each power is made up of a number of Adepts (sorcerers), each of which corresponds to a different element: fire, water, air, and so on.

At the start of the game, all the Adepts are situated in their respective elements. During play, the aim is to move them into strategic positions in an attempt to wipe out the opposition. Adepts can battle with others of their kind, or they can summon beasts to be their emissaries.

Less barbaric, and certainly more leisurely than combat, is to cast a spell. You can despatch an enemy creature by simply banishing it with a banish spell. Creatures wounded in battle can even be healed, although these tricks take up a lot of your energy.

On the whole, Archon II is a challenging and well-designed game, though one which should be avoided by those who have a copy of Archon.

Seeing is believing

GAME: Ballblazer

MACHINE: Commodore 64/128
Amstrad, Apple, Atari

SUPPLIER: Imagineering

PRICE: \$19.95, 34.95 (C64)
\$39.95 (Apple, Atari)
\$19.95 Amstrad

Lucasfilm already has a reputation for producing stunning visual effects on film, so it's not surprising that the graphics in Ballblazer, its latest computer game, are some of the best to be seen on a home computer.

Although you wouldn't know it from the title, Ballblazer is a kind of futuristic one-on-one football played between two high-speed rotofoils on a frictionless



grid, where the aim is simply to score goals.

Onscreen, Ballblazer features two boxes, each one showing a view out of the front window of a rotofoil; this is what the 'pilot' sees as he scuds across the playing grid. The aim of Ballblazer is to score goals, but with a difference. Obviously you can't kick the ball because you're in a rotofoil, but you can catch it in the force field that surrounds your rotofoil.

When the ball is caught in your force field, a small onboard computer automatically orientates your craft towards your opponent's goal. If you're too far away, your target will be obscured due to the curvature of the playing surface. Even so, pressing 'fire' sends the ball hurtling across the grid and, if you're lucky, into the goal. The further away you are when you score, the greater the number of points gained.

Controlling a rotofoil takes a great deal of practice, and the novice will probably turn gut-wrenching circles before getting to grips with the playing surface.

After some time spent playing against a friend or the computer, moving around soon becomes quite easy. It's worth persevering just for the sight of your opponent's rotofoil rushing towards you, the ball orbiting it in its force field.

Ballblazer is a masterful piece of programming that cannot be appreciated in words or pictures: it has to be seen to be believed.

END

ARCHIVE COMPUTER SERVICES SYDNEY PTY. LIMITED

(INCORPORATED IN N.S.W.)



Microcomputer Products — Sales & Specialists

SHOP 13, MOUNT STREET PLAZA,
MOUNT & WALKER STREETS,
NORTH SYDNEY, N.S.W. 2060

Tel: (02) 923 1200

Please address mail to P.O. Box 1231, North Sydney, 2060

**JUST RELEASED & SELLING LIKE
HOT CAKES 640K RAM COL.**

The President Jr.

IBM COMPATIBLE. USE IT AT
HOME OR IN THE OFFICE.
INCLUDES FREE SOFTWARE
& FREE CARRYING CASE

\$2150
(RGB VDU \$499)

PRESIDENT 16 SERIES

256Kb + 1x360K Diskette	\$2840
512Kb + 2x360Kb Diskette	\$3416
512Kb + 10Mb Hard Disk	\$4566
512Kb + 20Mb Hard Disk	\$4816

OPEN ACCESS INCL FREE

OLIVETTI M24

256Kb + 2x360Kb Diskettes	\$3665
640Kb + 2x360Kb Diskettes	\$3865
640Kb 10Mb + 1x360Kb	\$4600
640Kb + 20Mb + 1x360Kb	\$4900

includes mono V.D.U. & MS DOS

HARD DISKS FOR YOUR CURRENT IBM OR COMPAT.

Seagate 10	\$1150	Tandon 10	\$1200
Seagate 20	\$1400	Tandon 20	\$1600
Miniscribe 10	\$1300	Qubie 10	\$1200
Miniscribe 20	\$1650	Qubie 20	\$1450

ALL INCLUDE CTRLR & CABLES

EPSON LX80 PRINTER

105 CPS DRAFT.
FEATURES NLQ PRINT

\$470

RITEMAN PRINTERS

120 CPS **\$406** 140 CPS **\$475**
160 CPS **\$655**

Dataflex	\$812.50
Timeline	\$760.00
IBM. PC & XT	\$760.00
Wordstar Professional	\$481.00

Microsoft Multiplan
Graftalk
Microfocus Level II Compilers
Samna III

ARCHIVE TAPE BACKUP

Internal 60Mb	\$2350
External 20Mb	\$2260
External 60Mb	\$2350

MONITORS

Taxan Super Vision 3	\$720
Thompson DTX 2001	\$499
Taxan 1201	\$320
Taxan Super Vision 4	\$1150

Framework	\$860
Knowledgeman	\$646
DBase II	\$550
DBase III	\$762

SUPER SPECIAL \$7660

PRESIDENT AT
20Mb Hard Disk, 512Kb RAM,
1.2 Mb Diskette, DOS 3.1

FREE 256Kb JR INCLUDED

**FROM ALL AT ARCHIVE:—
WE WISH YOU ALL A MERRY CHRISTMAS AND
A HAPPY AND PROSPEROUS NEW YEAR**

ARCHIVE COMPUTER SERVICES SYDNEY PTY. LTD.

YOUR EXPERIENCED PROFESSIONAL COMPUTER DEALER

Delivery charges extra. All prices include tax. Prices subject to change. IBM is a Reg. TM of International Business Machines.

Number crunching

Howard Oakley looks at hardware and software enhancements which make scientific and number-intensive computing feasible with personal computers.

There was a time when scientists, engineers, and others whose computational requirements were number-intensive had to resort to mainframe computers. I can well remember the tedium of batch-processing by a remote computer, and the frustration of trying to cope with poor lines from a teletype terminal. Mercifully, powerful minis and micros are now available, enabling more jobs to be done locally.

Initially, scientists tended to use micros produced specifically for them by the likes of Hewlett-Packard, expensive machines which were restricted in their software and such facilities as colour graphics. However, the all-pervading IBM PCs and their imitators are now making inroads, and are already offered for laboratory data capture, sound instrumentation and analysis, and other work previously carried out by more

specialised machines. If they can fulfil the numerical requirements of scientists, they make available cheap hardware and an extensive user-friendly software base.

Using the IBM PC for this numerical work imposes two main additional demands: that it calculates accurately; and that it does so rapidly. These can be achieved by the 8087 co-processor, which turns the PC into an accurate and fast number-cruncher when used properly by software; simply plugging in the extra chip does not ensure that it is used at all. This article looks at ways of making the 8087 work in practical applications.

The 8087

The 8088 and 8086 chips used in IBM PCs and their compatibles are not

designed for floating-point arithmetical operations as such, but simply as general-purpose CPUs. The 8087, on the other hand, is a very efficient and accurate 80-bit arithmetical processor. It can carry out approximately 45,000 floating-point operations per second, with an extensive library of different operations, and will function as a true co-processor with the 8088.

It has two main problems associated with it: first, it uses IEEE format for the storage of numbers in memory (and internally), not the format used by the PC; and secondly, it requires software implementation (for example, only really being supported by version 2.0 of IBM's Macro-Assembler, and then not by the small assembler, ASM).

Most PCs allow the 8087 to be plugged directly into an empty socket on the CPU board, but do remember to adjust the internal switches to allow its use! This enhancement costs **\$344**, but you can go a stage further and buy a more sophisticated 8087-based expansion board with additional RAM and ROM.

Programming the 8087 in Macro-Assembler is not difficult, as the instructions are similar to Forth using an eight-register stack. IBM provides number format conversion utilities with the software, but a working knowledge of 8088 assembly language is essential in order to do anything useful. If you can aspire to this, then you may get away without additional software. But for us lesser mortals, a higher-level language is essential.

Language support

A number of high-level languages offer 8087 support. For those who favour more traditional ones, Pascal (including the excellent Borland Turbo Pascal), Fortran, and so on, are offered in many versions. APL is also available, and the more progressive may choose from several versions of Forth and C. Basic may well prove to be the best option for the average user, as there are two which use essentially standard IBM/Microsoft

Language	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Average
IBM Basic-A	1	4	13	11	13	21	33	38	16.75
IBM Bascompiler	0	0	2	1	1	1	2	10	2.1
87Basic	0	0	1	1	1	0	2	3	1.0
87Basic/Inline	0.02	0.03	0.19	0.11	0.17	0.27	0.55	1.48	0.35

Fig 1 APC Benchmark timings in seconds on an IBM PC/XT

Language	Time for 1000 loops
IBM Basic-A interpreter	72.4
IBM Basic compiler	68.2
IBM Basic compiler, /O switch	67.8
MicroWay 87Basic compiler	2.8
MicroWay 87Basic/Inline compiler	1.3

Fig 2 Non-linear Benchmark timings in seconds on an IBM PC/XT

Spreadsheet	8087 addition	multiplication	exponentiation	total
Framework	0	40.5	40.7	1997
	+	40.5	40.7	90
Enable	0	27.9	34.5	989
	+	26.5	34.5	32
Lotus 1-2-3	0	6.6	8.1	129
Smart	0	6.1	7.0	71
	+	5.6	5.6	8

Fig 3 Spreadsheet Benchmarks in seconds; US NSTL figures for 50 x 50 means

Basic and then call in the 8087 during compilation.

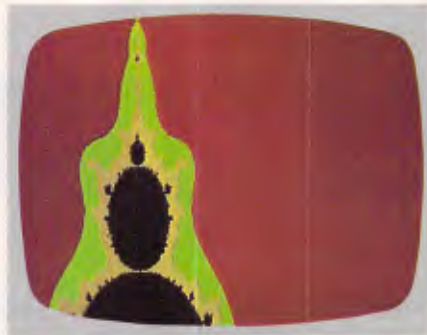
MicroWay has the longest tradition of supporting the 8087 of any of the firms that I am aware of. Not only can it offer all the aforementioned languages, but it can provide the two versions of MBasic (as well as non-standard Basics, such as Summit BetterBasic).

The first MBasic package is 87Basic, which is now in its fourth version and which is well tried and proven. This is a set of IEEE/8087 patches to the IBM/Microsoft Basic compiler, which effectively emulates and replaces the latter. The documentation is brief and the presentation is workmanlike rather than glossy, but the produce is as reliable as the original compiler. On the disk is an 8087 test and Benchmarking program, as well as various demonstrations.

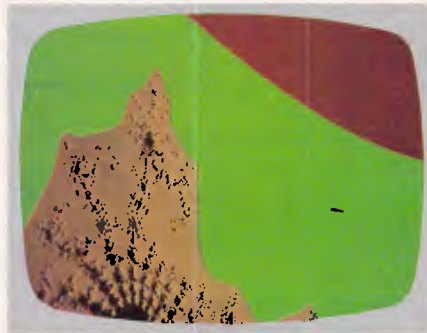
The other more recent produce is 87Basic/Inline, which includes a copy of 87Basic but takes a different approach altogether. You need the IBM Macro-Assembler and Basic compiler to run this compiler post-processor. First of all, the package compiles your Basic program using the ordinary compiler. It then takes the listing from that, and generates inline code for all floating-point operations to utilise the 8087 to its best. The resulting module is then passed through the MacroAssembler, and linked to produce an .EXE program.

The whole process is carried out using a batch file, and takes a little over two minutes for an average Basic source program. It is very easy to use, but requires large amounts of disk memory so is awkward on machines without hard disks. It also offers two useful enhancements: an addition to the TIME\$ clock to give hundredths of a second (invaluable for timing Benchmarks), and the facility to compile separate 64k program segments to produce a final program far exceeding 64k in length. Although it is more recent than 87Basic and MicroWay admits to some bug limitations (such as not having implemented PLAY and DRAW yet), I have been unable to find any fault in the current version, 1.09.

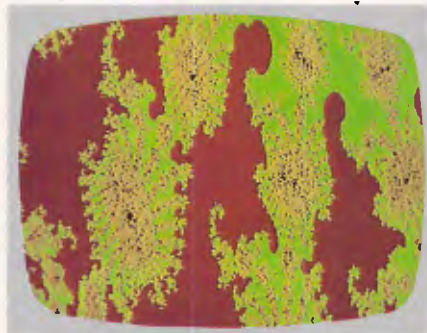
The effect of using the 8087 in APC Benchmarks is dramatic. Fig 1 illustrates that 87Basic and 87Basic/Inline produce almost unbelievable accelerations in timings, even when they are not number-intensive. I had to carefully check the .ASM listing for 87Basic/Inline to ensure that it was not cheating by eliminating purposeless loops, but found that all it did was produce very slick code indeed, running both 8088 and 8087 as efficiently as possible. Fig 2 gives results for a truly number-intensive Benchmark, which loops through $X =$



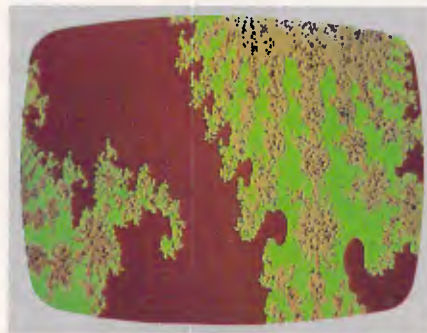
Screenshot 1



Screenshot 2



Screenshot 3



Screenshot 4

$TAN(ATN(EXP(LOG(SQR(X*X)))))) + 1$ a thousand times. Here, the advantages of using the 8087 as against compilation alone are obvious.

With regard to accuracy the standard interpreted language produces errors, typically of the order $1.0E-4$ to $1.0E-7$, in contrast to the 8087's amazing greatest

error of $2.7E-15$. 87Basic/Inline (and 87Basic) thus retain all the precision possible in converting back to IBM's double-precision format, and even offer the ability to convert direct from the 8087's 80-bit format, for those who need it.

Applications software

The main argument in favour of using a widely popular micro for specialist work must be the range of software packages available. There are already a number of statistical and CAD/CAM packages which support or rely on the 8087, and anyone needing those facilities must consider the 8088/8087 combination in making their choice.

Manipulating numbers in science is often the same as in business: the data needs to be stored in a convenient way, then manipulated on a spreadsheet, before presentation in graphs and in tables set in a text document. In other words, scientists need 'integrated' software, too. The new versions of Lotus 1-2-3, Symphony and others which support the 8087 should now be available in Australia. I am sure that they will be significant improvements on their predecessors, but there is already a tried and tested integrated package which supports the 8087, as well as offering exceptional numerical manipulation and statistics. This is Innovative Software's Smart.

The US National Software Testing Laboratories have Benchmarked 50×50 spreadsheet calculations for a number of packages, the results of which are presented in Fig 3. Smart shows up well on this, both with and without the 8087, and 1-2-3 is also very swift. However, the figures for exponentiation are worth looking at more carefully. Scientific work is full of such non-linear operations, as is statistics, so these should be a major determinant in selecting a package for such use.

I have also checked the accuracy of calculations in the spreadsheets of 1-2-3 and Smart. Both retain the accuracy afforded by double-precision numbers (that is, errors are around $4E-16$), although 1-2-3 offers a displayed precision of up to 15 decimal places as compared to Smart's nine. The latter does, though, provide far more powerful functions, and even such unusual features as calculated fields in the database (which I use for averages and the like, saving work on the spreadsheet).

The program in Fig 4 illustrates how the 8087 can allow a micro to do a main-frame job. This produces medium-

QL — the Sinclair quantum leap

The Sinclair QL offers an incredible 128K RAM — expandable to 640K.

It uses a 32-bit processor — the advanced Motorola 68000 chip. It's supplied complete with a suite of four business programs.

It has two built-in Microdrives, each offering 100K of storage for programs and data.

It has networking capability, a full-size QWERTY keyboard; its own operating system — QDOS — which accommodates multi-tasking. It drives colour and monochrome monitors and TV, incorporates

RS232-C serial interface, accepts joystick cursor control . . .

It allows you to do *more* than any other micro available today. It tackles business routines with confidence. It plays games of altogether exceptional sophistication. It makes the most complex programs simpler and faster to write or run. And because it's so powerful, it's uniquely user-friendly — gentle and helpful with beginners, flexible and responsive to advanced programmers.

In fact, the Sinclair QL matches and surpasses the performance of machines costing thousands of dollars.

Now it costs only \$799.00 to make the Sinclair quantum leap!

SINCLAIR SPECTRUM PLUS STARTER PACK

Britains top selling micro computer

Includes Spectrum plus, printer and

12 free programs for only **\$498.00***

Basic training program for only \$19.95 with every starter pack sold*

* while stocks last

- 64K total memory
- Full size typewriter keyboard
- Sleek black styling
- Uses standard colour TV and cassette recorder
- Huge range of software.

ATARI 520 ST

- 68000 CPU
- 512K Ram
- Gem Operating System
- 640 x 400 'CAD' resolution
- Australian 'Pal' version
- Inbuilt midi interface
- RS232 & centronics port
- Two joystick ports
- 500K 3½ inch drive

CALL FOR PRICE

AMSTRAD PCW 8256

The complete business solution

- 256K Ram
- 3½" 180K drive
- NLQ printer
- IBM style detachable keyboard
- High resolution green screen monitor
- 90 column x 32 line display
- CPM plus operating system
- Gem (Icon Software)
- "Pull down menu" word processor
- Ultrafast Mallard basic
- Digital Research Logo

ALL THIS FOR AN INCREDIBLE \$1450.00

RAMPAGE PC/XT

If quality counts there is no better machine than ours. We are so confident we back up our machine with a full 12 month warranty

Features:

- 640K on motherboard
- Serial port
- Colour or mono card
- Clock calendar
- 12 month warranty
- Free PC DOS while stocks.
- 2 x 360K drives
- Centronics port
- 135 watt power supply
- Excellent backup
- PC/AT style keyboard

We can also configure systems to your exact needs

ONLY \$2200.00

LATEST SPECTRUM SOFTWARE

Elite	\$39.95	Terramolinos	\$24.95	Brian Jack's Superstar	
Shadow Fira	\$29.95	MF Print	\$24.95	Challenge	\$12.50
Popeye	\$29.95	Hypersport	\$29.95	Dukes of	
Fairlight	\$29.95	Fourth		Hazzard	\$19.95
Mersport	\$29.95	Protocol	\$34.95	Eddie Kidd's Jump	
Shadow of the		Scooby Doo	\$22.95	Challenge	\$12.50
Unicorn	\$44.95	The Quill	\$44.95	Flight	
Starquake	\$24.95	Beach Head II	\$24.95	Simulation	\$14.95
Frankie Goes to		Astronomer	\$29.95	Grand National	\$19.95
Hollywood	\$29.95	Supercode III	\$39.95	Great Space	
Robin of the		C-DOC	\$29.95	Race	\$14.95
Wood	\$29.95	Superchess 3.5	\$29.95	Gremkins	\$24.95
Daley Thompson		Hobbit	\$39.95	Jasper	\$12.50
Super Test	\$24.95	A Day in the		Sam Stoot	\$14.95
World Series		Life	\$14.95	Sports Hero	\$19.95
Basketball	\$22.95	Alien 8	\$29.95	Squash	\$19.95
Zoids	\$24.95	Ashkeron III	\$19.95	Worse Things Happen	
Chimera	\$19.95	Backpackers Guide		at Sea	\$14.95
Macadam		Part 1	\$12.50		
Bumper	\$24.95				

LATEST SPECTRUM HARDWARE

- AMX Mouse
- Spectrum plus upgrade kit
- Microdrive expansion system
- Microdrive storage boxes
- Multiface one
- call
- \$99
- \$299
- call
- call
- Ram turbo joystick interface
- Opus 3½ inch disk drive
- VTX 5000 modem VIATEL
- call
- \$249
- call
- call
- call

gametronics
6/177 Toorak Road, South Yarra 3142. (03) 241 3031

Mail Order/Cheque or any credit card.

Please send me

- your Spectrum catalogue your Commodore catalogue
- your BBC catalogue 520 ST information
- your QL catalogue amstrad information

ITEMS @ \$

..... \$

..... \$

Add \$8.50 P&P H/ware or \$2.50 S/ware:

..... \$

Name

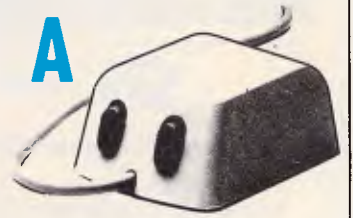
Address

Phone

Signature

Bankcard No. Exp. Date

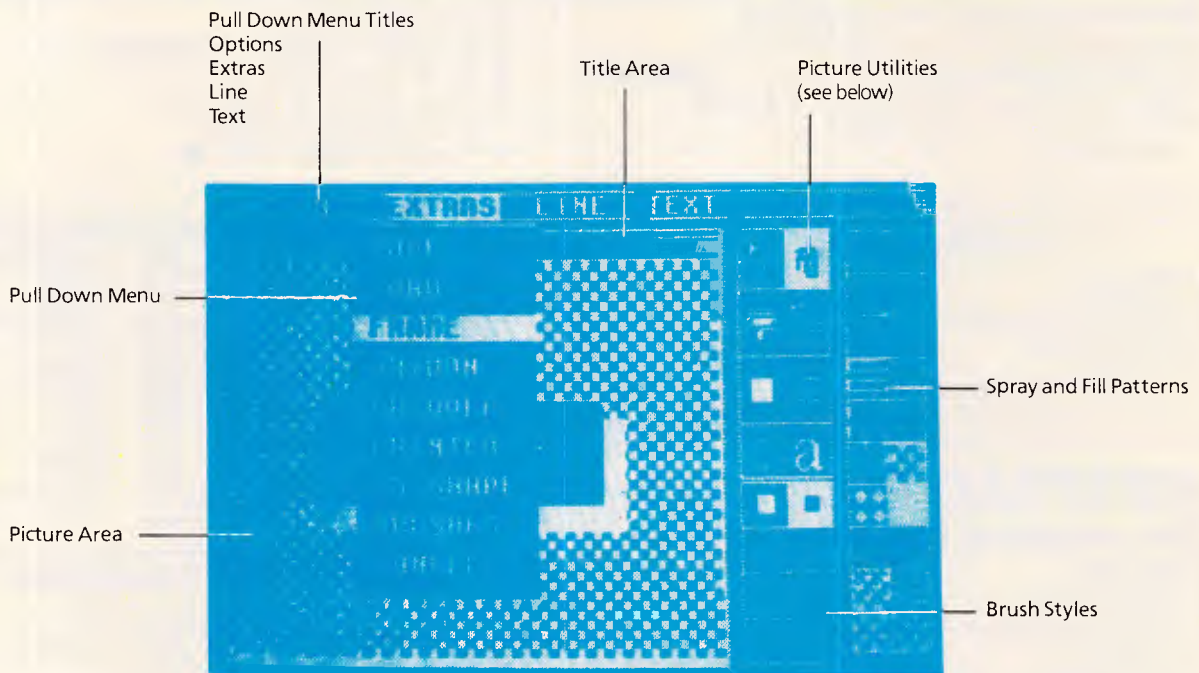
FOR COMMODORE C64 STUNNING GRAPHICS AT A TOUCH . . .



WITH THE DATEX OPTICAL MOUSE MS.I

- **FRIENDLY** — with pull down menus & icons!
- **HI RES** — works in bit mode
- Disc & tape software included
- Dump designs to printer, disc or tape
- Very high quality optical circuits
- Integrates with other forthcoming packages!
- ,Mac'-like screen and features.
Epson compatible

ONLY \$159.95 RRP



To order: send cheques, MO's etc. to:

THE BIT SHOP

P.O. BOX 28, EARLWOOD 2206
OR CALL (799-8525) FOR MORE INFORMATION

WIN A DATEX MOUSE

Entries should be received no later than February 21, and prizes will go to the first three correct entries pulled out of the editorial hat.

Send your entries to:

Australian Personal Computer
2nd Floor
215 Clarence Street
Sydney NSW 2000

Name _____

Address _____

Postcode _____

1. Which computer was the first to feature a mouse?

2. Which company distributes the Datex Mouse?

PROGRAMMING

```
10 REM $title: 'Mandelzoom'
20 REM $subtitle: 'by Howard Oakley'
25 REM Version 1.01
30 REM after Hubbard & Dewdney
31 REM The origin of axes is at the top left corner of the screen
32 REM and the real axis is the vertical one, the height of the screen
33 REM whilst the imaginary one is horizontal.
34 REM Real values should be from -2.05 to +0.55
35 REM and imaginary values from -1.25 to +1.25
36 REM Members of the Mandelbrot set of complex numbers are black,
37 REM and are those which are stopped at 1000 on the iteration.
38 REM Full description appears in Scientific American, August 1985.
39 REM Erase PIC file after use, as it is half a megabyte'
40 KEY OFF : DEFINT I-O : DEFDBL A-H : DEFSNG P-U
45 OPEN "PIC" FOR OUTPUT AS #1
50 SCREEN 0,1 : COLOR 7,1,0 : CLS
60 LOCATE 2 : PRINT TAB(20) "MANDELZOOM"
70 LOCATE 5 : PRINT "This initial phase allows you to enter your desired setting
s."
80 LOCATE 7 : INPUT "Enter real co-ordinate of NW corner: ", ACORNER
90 LOCATE 9 : INPUT "Enter imaginary co-ordinate of NW corner: ", BCORNER
100 LOCATE 11 : INPUT "Enter height of rectangle: ", CSIDE
110 LOCATE 13 : INPUT "Do you wish to change these ? Enter 1 for yes, 0 for no"
, IRESP
120 IF IRESP=1 THEN 50
130 CLS
140 PRINT "CALCULATING"
150 AGAP=CSIDE/320
160 BGAP=CSIDE/200
170 FOR N=0 TO 199
180 FOR M=0 TO 319
190 AC=ACORNER + N*AGAP
200 BC=BCORNER + M*BGAP
210 AZ=0 : BZ=0 : OCOUNT=0 : CSIZE=0
220 WHILE ((CSIZE<2) OR (CSIZE=2)) AND (OCOUNT<1000)
230 AZT = ((AZ*AZ)-(BZ*BZ))
240 BZT = 2*AZ*BZ
250 AZ = AZT+AC
260 BZ = BZT+BC
270 OCOUNT = OCOUNT+1
280 CSIZE = SQR((AZ*AZ)+(BZ*BZ))
290 WEND
300 PRINT #1,OCOUNT
305 LOCATE 2 : PRINT TAB(2) M,N
310 NEXT M
320 NEXT N
330 CLOSE
1000 Q=0 : R=0 : S=0 : T=0 : U=0 : CLS
1005 PRINT "SORTING"
1010 TA=0 : TB=0 : TC=0
1020 UA=0 : UB=0 : UC=0 : UD=0
1070 OPEN "PIC" FOR INPUT AS #1
1180 FOR N=0 TO 199
1190 FOR M=0 TO 319
1195 INPUT #1,OPIC
1200 IF OPIC<11 THEN Q=Q+1
1210 IF OPIC<21 THEN R=R+1
1220 IF OPIC<31 THEN S=S+1
1230 IF OPIC<100 THEN T=T+1
1231 IF OPIC<200 THEN TA=TA+1
1232 IF OPIC<300 THEN TB=TB+1
1233 IF OPIC<400 THEN TC=TC+1
1240 IF OPIC<500 THEN U=U+1
1241 IF OPIC<600 THEN UA=UA+1
1242 IF OPIC<700 THEN UB=UB+1
1243 IF OPIC<800 THEN UC=UC+1
1244 IF OPIC<900 THEN UD=UD+1
1250 NEXT M
1260 NEXT N
1262 CLOSE : CLS
1264 LOCATE 2 : PRINT "DISTRIBUTIONS ARE:"
1265 PRINT "up to 10",Q
1270 PRINT "11 - 20",R-Q
```

Fig 4 A program which illustrates how the 8087 allows a micro to do a mainframe job

BHP, AWA, The Commonwealth Bank, Dick Smith Electronics and 15 divisions of Telecom all use our C Compilers.

They chose our compilers over the competition because of their ease of use, efficient compiled code and excellent error handling.

Not to mention that our software is 100% Australian and we can provide a level of after-sales support unheard of for imported products. And the fact each compiler includes a macro assembler, linker and librarian and comes with source code for the library routines.

Last but not least our prices are highly competitive - less than half that of some popular imported compilers.

OUR IRON-CLAD GUARANTEE

If you buy a compiler from us and you don't think you got value for money, you may return it to us within 14 days for a FULL REFUND.

This is in addition to our 12 months free update and telephone support policy - anything you don't understand we will be happy to clarify for you.

Remember:

- Our compilers produce smaller, faster code than ANY competitive product.
- They're easy to use - a single command can compile and link an entire program.
- Strong type-checking and accurate diagnostic messages help you get your code right FAST.
- Totally Australian products with expert help only a phone call away.
- A watertight money-back guarantee.

So join 19 divisions of CSIRO, Olivetti, Western Mining Corporation and a gaggle of Government Departments - phone or write today to get your copy of the HI-TECH C Compiler.

PRICES:

8086 Compiler (for MS-DOS, PC-DOS or CP/M-86)	\$300.00
Z80 Compiler (for CP/M-80)	\$250.00
"A Book on C" by Kelley/Pohl	\$32.95
Delivery charge per order	\$8.00



Phone us NOW on (07) 38 3852 to place your credit card order or write to the address below. When ordering be sure to specify the type of computer and operating system you are using and the disk format required.



HI-TECH SOFTWARE
P.O. BOX 103, ALDERLEY, QLD 4051.
11 PAVONIA ST., ASHGROVE, QLD, 4060
PH. (07) 38 3852
BULLETIN BOARD: (07) 38 6872

PROGRAMMING

Fig 4 continued

```
1280 PRINT "21 - 30",S-R
1290 PRINT "31 - 99",T-S
1300 PRINT "100 - 199",TA-T
1310 PRINT "200 - 299",TB-TA
1320 PRINT "300 - 399",TC-TB
1330 PRINT "400 - 499",U-TC
1340 PRINT "500 - 599",UA-U
1350 PRINT "600 - 699",UB-UA
1360 PRINT "700 - 799",UC-UB
1370 PRINT "800 - 899",UD-UC
1380 PRINT "900 - 1000",64000!-UD
1400 INPUT "Enter 1 to select cut-offs and display", IENT
1410 IF IENT=1 THEN CLS ELSE 1410
1440 OPEN "PIC" FOR INPUT AS #1
1450 LOCATE 2 : INPUT "Enter first cut-off (10 to 900): ", ICUT
1460 LOCATE 4 : INPUT "Enter second cut-off (more than first): ", JCUT
1470 LOCATE 6 : INPUT "Enter third cut-off (more than second): ", KCUT
1475 PRINT "When done, enter 1 to terminate and clear screen"
1476 INPUT "Enter name of screen file to save image: ", Z$
1477 IF Z$="" THEN IFLG=0 ELSE IFLG=1
1480 ICUST=ICUT+1 : JCUST=JCUT+1
1485 SCREEN 1,0 : COLOR 0,0 : CLS
1490 FOR N=0 TO 199
1500 FOR M=0 TO 319
1510 INPUT #1,OPIC
1520 IF (OPIC<ICUST) THEN PSET(M,N),2 : GOTO 1600
1530 IF (OPIC>JCUT AND OPIC<JCUST) THEN PSET(M,N),1 : GOTO 1600
1540 IF (OPIC>JCUT AND OPIC<KCUT) THEN PSET(M,N),3 : GOTO 1600
1550 PSET (M,N),0
1600 NEXT M
1610 NEXT N
1620 IF IFLG=0 THEN 1680
1630 DIM ISCRN(43) : OPEN Z$ FOR OUTPUT AS #2
1640 FOR N=0 TO 199
1650 GET (0,N)-(319,N),ISCRN
1655 FOR M=0 TO 43
1660 PRINT #2,ISCRN(M)
1665 NEXT M
1670 NEXT N
1680 LOCATE ,,0 : CLOSE
1690 INPUT "",I
1700 IF I=1 THEN CLS : END ELSE 1690
2 REM $title: 'Mandelzoom display'
3 REM $subtitle: 'by Howard Oakley'
4 REM for displaying screens saved using Mandelzoom (MANDZOOM)
5 REM version 1.01
10 SCREEN 0,1 : COLOR 7,1,0 : KEY OFF : CLS : DEFINT I-0
20 LOCATE 2 : PRINT "DISPLAY OF MANDELZOOM PICTURE"
25 PRINT "When done, enter 1 to terminate and clear screen"
30 INPUT "Enter name of screen file to be displayed: ", Z$
32 IF Z$="" THEN 130
40 SCREEN 1,0 : COLOR 0,0 : CLS
50 DIM ISCRN(43) : OPEN Z$ FOR INPUT AS #1
60 FOR N=0 TO 199
65 FOR M=0 TO 43
70 INPUT #1,ISVAL
72 ISCRN(M)=ISVAL
75 NEXT M
80 PUT (0,N),ISCRN,PSET
90 NEXT N
100 CLOSE : LOCATE ,,0
110 INPUT "",I
120 IF I=1 THEN 130 ELSE 110
130 END
```

resolution pictures of the Mandelbrot set, using a process called Mandelzoom (outlined in AK Dewdney's article in the August 1985 issue of *Scientific-American*). Essentially, each point on the screen is represented by a number

between 1 and 1000. Numbers of 1000 are points which are in the Mandelbrot set of complex numbers, and which survive 1000 iterations of the calculating loop and are coloured black, while those which survive less than that lie outside

the set, and end up with a detailed and interesting image.

Screenshot 1 shows the majority of the set, the NW corner of which is at real coordinate 2.0, imaginary coordinate -1.25, and of height +2.5. Screenshot

PROGRAMMING

2 is a zooming in on (NW corner -0.75 , $+0.20$, height $+0.02$), at a linear magnification of 125. Screenshot 3 is a further magnification on (NW corner -0.737 , $+0.207$, height $+0.001$), and the fourth on (NW corner -0.7355 , $+0.7355$, $+0.2077$, height $+0.0002$), having an overall magnification of 12,500. Exploration of other areas and magnifications will reveal a wealth of beautiful detail.

The worst possible case, in which all 64,000 points on the medium-resolution screen require 1000 iterations, results in over one thousand million point operations. This exceeds what is normally thought practical for micros, but takes only 19 hours on an IBM PC/XT using 87Basic/Inline. If the Basic program is compiled without using the 8087, it would take eight days for that one screenful, while interpreted Basic alone would need about 1.5 months. Most screens take only a tenth of these times. The use of the 8087 can thus turn many number-intensive jobs into practical ones for a micro.

The program presented here is of little practical value, but similar techniques are required in simulation and other work likely in the scientific field. This is why

the best PC CAD/CAM packages need the 8087 or picture generation becomes impossibly slow, and why heavyweight statistical packages like to use it too.

Conclusion

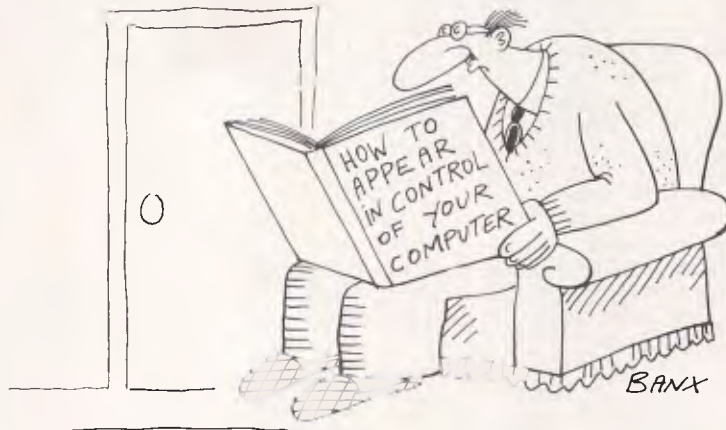
Most scientists already have access to mainframe computers, so what use is the 8087-boosted PC? Access to mainframes is expensive and restricted, and often entails frustrating delays.

The cost of micros is now so low that each worker can be provided with his

own micro, so access is much easier. The additional cost of equipping a PC with an 8087 is trivial, and software has now come of age to use the power of the co-processor.

I would seriously recommend anyone involved with number-crunching on any scale to consider this option. The article by Stephen Fried, MicroWay's founder, in the 1984 *Byte Special* on IBM PCs is well worth reading.

You can keep your 80386s and 68020s for the present: 8087 plus 8088 equals a good mini! **END**



LOCK YOUR LOTUS!

Are your worksheets a security risk? At present, your worksheets are available to anyone who has access to your PC. Hard disk systems in office environments are particularly vulnerable.

PADLOCK-1-2-3 is a complete security system for LOTUS 1-2-3 and LOTUS SYMPHONY worksheets. Using PADLOCK-1-2-3, confidential files can be locked using a password known only to you. Without the password, your worksheets can't even be accessed.

PADLOCK-1-2-3 includes many additional security features to those of the LOTUS 1-2-3 version 2 "password" facility. Features include:

- Worksheets are locked or unlocked in a few seconds, no matter how large.
- Locked worksheets may be copied or backed up, but remain unusable until unlocked.
- Easy to use "windowing" operation with on-screen help facility.
- Directory listings (with locked files highlighted) available at a keystroke.
- Logging of all unauthorised access attempts to an invisible system log file.
- "Master User" mode, allowing the system manager complete information and control.

ONLY
\$150



Secure your sensitive business data with

PADLOCK-1-2-3

Practical Solutions Pty Ltd
GPO Box 3461
SYDNEY 2001
(02) 260-1664

DEALER
ENQUIRIES
WELCOME

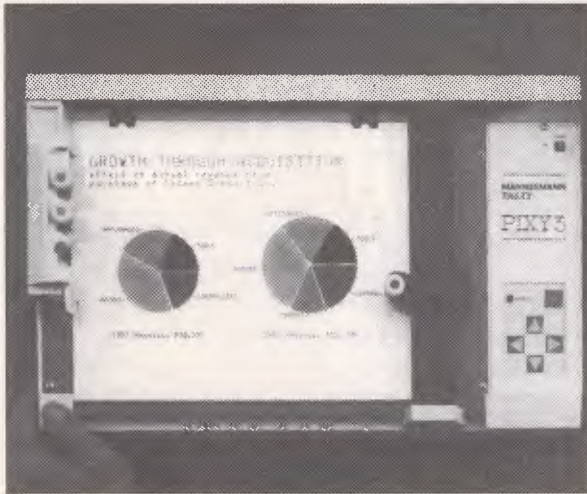
Also available **PADLOCK-DIR** for your hard disk subdirectories

PADLOCK-PC Complete security for your PC System

LOTUS 1-2-3 and SYMPHONY are trademarks of Lotus Development Corp.

PROFESSIONAL PRESENTATION GRAPHICS WITH YOUR PERSONAL COMPUTER —

PIXY3



\$395.00

inc. Tax

Freight Extra

Convert computer data into plots in seconds. Develop persuasive, accurate

PERFORMANCE THAT COMMANDS ATTENTION

pie charts and bar graphs in minutes. Design with color knowing that the PIXY 3 Microplotter will change up to three pens automatically.

Created for speed, high resolution and ease of use, the PIXY outperforms everything else in its price range. In fact, you would have to spend up to twice the cost of a PIXY to equal its performance.

When you need artist quality, presentation graphics in a hurry, there's no comparison. The compact PIXY Microplotter delivers professional results for less.

THATS RIGHT

\$395.00

inc. Tax

SPECIFICATIONS

Plotting Speed:
200 mm/sec (8 in/sec), programmable

Step Size:
0.1 mm (.004 in)

Plotting Area:
180x245 mm (7x9.7 in)

Media Size:
 8.5x11 in (ANSI A size)
 210x297 mm (DIN A4 size)

Repeatability:
Same pen — 0.3 mm (.012 in)
Pen to pen — 0.4 mm (.016 in)

Distance Accuracy:
± (1% travelled distance + 0.3 mm)

PENS

Type:
Fiber tip — water base for paper, oil base for transparency film

Colors:
black, red, blue, green, brown, orange, rose.

CHARACTER SET

Basic:
96 characters ANSI or other (specified by font command)

Extended:
 37 Greek characters
 9 international character sets

INTERFACES
 8-bit parallel or
 RS-232 C

POWER REQUIREMENTS

Voltage:
 220 V or 240 VAC ± 10%

Frequency: 48 to 62 Hz

Consumption: 40 VA maximum

ENVIRONMENTAL REQUIREMENTS

Temperature:
5 to 35°C (41 to 95°F)

Relative Humidity: 35 to 75%

INDICATORS

Power On

Error

OPERATING MODES

Plotter

Printer

Diagnostic

DIMENSIONS AND WEIGHT

Height: 12.3 cm (4.9 in)

Width: 43.0 cm (16.9 in)

Depth: 26.7 cm (10.5 in)

Weight: 6 Kg (13.2 lb)

STANDARD ACCESSORIES

Fuse 0.3A 220V: 240 VAC

2 Paper clamps

Operator's manual

Black, red and blue pens

OPTIONAL EQUIPMENT

Pens: Eight colors

We have only 100 at this Super Special Price so get your order to us before we

SELL OUT

This offer will not be repeated place your order now

NATIONAL CAD SOLUTIONS

P.O. BOX 30 STAFFORD QUEENSLAND 4053

07 352 6257



Getting migraines waiting for the answer?



Are you the kind of person who wants answers in a split second?

In today's helter-skelter business world you can't afford to wait for a moment. If waiting has been one of your biggest headaches, relief is now at hand.

The solution?

Just take APC III. (Advanced Personal Computer.)

It is quite simply one of the most complete personal computers in the world. With a price tag for the basic single disk system hardware of less than \$3000.

And the hardware is no slouch.

It gives you ultra-high operating speed, with true 16 bit processing performance at 8MHz. (For the non technically minded, that's very fast.) With its massive memory capacity

of up to 640K bytes, it means your processing headaches can be solved in micro seconds.

Software to match this kind of performance is not a headache either.

The APC III comes with a comprehensive collection of leadership software for each business application. From word processing to finance. Accounting to integrated packages. MS-DOS and UNIX systems are supported to give you even less headaches.

And with every machine you get a company as well, NEC, Japan's largest maker of personal computers. The company that took out the coveted 1983 Computer of the Year Award. So you get things like an extension of the normal 90 day warranty to a full 12 months free maintenance if you want it. And a tollfree Hotline service that has an expert on the other end of the phonenumber anytime you need a niggling problem solved. Just ask your NEC dealer for details.

To find out more just write or phone us now.

There are enough headaches in life to cope with, without purchasing one. Take an APC III instead.

NEC

Please send me more details on the new APC III.

Name Title

Company

Address

..... Postcode

Phone No

Application

Take APC III



The Electronic Aspirin is here.

C.A.E. ELECTRONICS

(02) 671-6951 — 621-4242 P.O. Box 62, BLACKTOWN, 2148
202 Sunnyholt Road, corner Vardys Rd, Blacktown, NSW 2148.

Copyright © 1983 NEC



Our monthly pot-pourri of hardware and software tips for popular micros. If you have a favourite tip to pass on, send it to 'TJ's Workshop', 2nd floor, 215 Clarence Street Sydney 2000. Please keep your contributions as concise as possible. We will pay \$10-\$25 for any tips we publish. APC can accept no responsibility for damage caused by using these tips, and readers should be advised that any hardware modifications may render the maker's guarantee invalid.

COMMODORE 64 MACHINE CODE RANDOM NUMBERS

This short machine code routine solves the problem of generating random numbers from machine code. Although the program is for the Commodore 64, the technique can be applied to any micro.

A location in memory that is frequently updated (often a video refresh register or the least significant byte of a system clock) is used. It is changed so frequently that as long as it is accessed at irregular intervals, it can be

treated as if it were a random number. This is not, of course, truly random, and should not be used for serious mathematical applications.

This particular routine sets the high-frequency byte of voice number 3, and then takes a number from the random number generator at 54299 and compares it with an upper limit. If the number is not less than this, it takes another until it has one that is. When a suitable number has been found, the lower limit is added to it and the result is stored in location 53247.

The example given has the upper limit at 11 and the lower limit at 5; this will give numbers between 5 and 15. These values can be changed by the programmer. *D Traynor*

ASSEMBLER LISTING

```
ORG $C000
LDA #$B1
STA $D412 ;sets voice no.3 to noise
LDA #$CB
STA $D40F ;sets frequency high byte voice 3
LDA $D41B ;load acc. with random number
CLC
CMP #$0B ;is the number less than 10
BCS $C00A ;if not get another
CLC
ADC #$05 ;add 5 to the number
STA $CFFF ;store the number
RTS
```

BASIC LISTING

```
10 X=49152:READ N:IF N=-1 THEN END
20 POKE X,N:X=X+1:GOTO 10
30 DATA 169,129,141,18,212,169,200,141,15,212,173
40 DATA 27,212,24,201,11,176,248,24,105,5,141,255
50 DATA 207,96,-1
```

SQUARE ROOTS

This is essentially a Z80 machine code routine to find

square roots. It is provided in the form of a Basic loader program that is run to POKE the code into memory and can then be deleted. To use the routine, enter and run

the program, and make a note of the value of sq (save it first for subsequent use). To use the routine within your own programs, replace SQR(X) where X is any arithmetic expression by ((X) AND USR sq). The results are accurate to the 32 bits of mantissa of floating-point numbers.

The method used is Newton's method for improving approximations to roots. The second listing gives the assembly version of the program so that users of Z80 machines other than the Spectrum, for which this is written, can make use of the routine.

W Thomson

LISTING 1

```
9997 REM Square Rooter
9998 CLEAR PEEK 23730+256*PEEK
23731-37: LET sq=PEEK 23730+256*
PEEK 23731+1: PRINT "sq=";sq:
FOR a=1 TO sq+36: READ b: POKE
a,b: NEXT a
9999 DATA 239,61,192,56,1,1,4,
126,167,40,25,198,128,31,119,35,
126,23,48,2,207,9,54,127,197,
239,49,224,1,5,15,56,53,193,16,
244,201
```

LISTING 2

```
00 EF ENTRY RST 28 Enter calculator; x on stack
01 3D DEFB 3D If small integer, convert to fp
02 00 DEFB C0 Copy x to MEM(0)
03 38 DEFB 38 Exit; HL points to exponent byte
04 010104 LD BC,0401 B=4 iterations; C non-zero
07 7E LD A,(HL) A=exponent byte of x
08 A7 AND A A=0?
09 2819 JR Z,EXIT Exit if so, with y(4)=x=0
0B C680 ADD 80
0L 1F RRA y(0)'s exponent=
0E 77 LD (HL),A INT((x's exponent)/2)
0F 23 INC HL HL points to 1st mantissa byte
10 7E LD A,(HL)
11 17 RLA Carry flag= x's sign bit
12 3002 JR NC,X+VE Carry on if +ve
14 0F RST 08 If -ve, exit with
15 09 DEFB 09 error stop A
16 367F X+VE LD (HL),7F y(0)'s mantissa=: approximately
18 05 ITER PUSH BC Save count
19 EF RST 28 Enter calculator; y(n) on stack
1A 31 DEFB 31 Duplicate
1B E0 DEFB 30 Get MEM(0)
1C 01 DEFB 01 Exchange
1D 05 DEFB 05 Divide
1E 0F DEFB 0F Add; x/y(n)+y(n) on stack
1F 38 DEFB 38 Exit; HL points to exponent byte
20 35 DEC (HL) y(n+1)=(x/y(n)+y(n))/2
21 01 POP BC Retrieve count
22 10F4 DJNZ ITER Another iteration?
24 09 RET Exit; y(4) on stack; BC non-zero
```

This issue heralds changes in all those parts of APC concerned with programming. Our intention is to group programming features, Programs, TJ's Workshop and SubSet together, along with a regular Teach Yourself series, to form a bigger, better and brighter section.

Programs and TJ's Workshop will be combined within a new section called Program File, which will allow us to make our programming coverage more comprehensive and interrelated. The new section will occupy at least as much space as the constituent parts. Other changes to enhance the quality of Program File include an increase in documentation and more commented programs, more

Dac-easy accounting software cost **\$199.00**

THIS SYSTEM IS APPLICABLE TO BOTH SERVICE-PRODUCT INDUSTRIES
(INCLUDING DOCTORS, DENTISTS, ENGINEERS)

All 7 complete modules on 1 disk! Compare our features with other packages costing thousands more!

General

- Menu Driven • Fully Integrated
- MS-DOS & PC-DOS
- RUNS ON PC_{jr}, PC, XT, AT, AND COMPATIBLES
- Password Protection In All Programs
- Slipcased Binder
- OVER 300 DIFFERENT REPORTS!!
- OVER 90 ROUTINES!!
- File Capacity Limited Only By Disk Space
- Service Contract Available
- ONLY \$199.00 FOR ALL 7 MODULES
- Money Back Guarantee

Accounts Payable

- Check Printing • Automatic Allocation Of Available Cash To Payables
- Vendor Directories With Sorting By Vendor Code, Name, Or Territory
- Aging Reports With 7 Customized Columns
- Unlimited # Of Vendors
- Mailing Labels • 3 Year Vendor History For CRT Inquiry And Printing
- Flexible Payment Calendar
- Automatic Forecasting of Purchases
- Unlimited Allocations Per Invoice

Forecasting

- Unique program that automatically forecasts using your 3 year history
- Forecast Revenue And Expense Accounts
- Forecast Vendor Purchase
- Forecast Customer Sales, Cost, And Profit By Customer Or Salesperson
- Forecast Inventory Item Usage By 4 Automatic Methods

General Ledger

- Double Entry • Unlimited # Of Accounts
- Multi-Level Accounting
- Unlimited Departments
- 3 Year Account History For CRT Inquiry
- Pencil & Pen Feature To Correct Mistakes Without Reverse Entries
- UNIQUE Budgeting Routine (See Forecasting)
- CRT Voucher Inquiry

Accounts Receivable

- Open Item or Balance Forward
- 7 Customised Columns For Aging Report
- Unlimited # Of Customers
- Mailing Labels With 4 Different Sorts
- Automatic Finance Charges
- Supports Partial Payments • Directories
- 3 Year Customer History for # Of Invoices, Sales, Costs And Profits
- Customized Text On Statements
- Cash Flow Analysis • Sales Analysis

Inventory

- Supports Average, Last Purchase And Standard Costing Methods • Physical Inventory
- Accepts Any Measure Units Per Case Like Fractions/Dozens/Gross/Etc
- Automatic Changing Of Costing Methods
- Time And Product Inventory
- 3 Year Product History in Units, Dollars, Cost And Profits
- Automatic Forecast Of Product Sales
- Automatic Pricing Assignments

Purchase Order

- Allows Up To 99 Lines Per Purchase Order
- Per Line Discount In %
- Purchase Order Accepts Generic Discounts/Freight/Taxes/Insurance
- Purchase Order Accepts Back Orders & Returns
- Purchase Journal

Invoicing

- Invoicing On Plain Or Pre-Printed Forms
- Print Sales Journal
- Automatic Updating Of Committed Products in Inventory
- Ability To Customize Invoice For Remarks

NOT COPY-PROTECTED

Minimum Hardware Requirements: 128K memory, one 5¼ DSDD floppy disk, 132 column printer in compressed mode, 80X24 CRT, MS-DOS, PC DOS 2.0 or later.

Runs on your: IBM (PC_{jr}/PC/XT/AT), AT&T, EPSON, TANDY (1000/1200/2000), TI, COMPAQ, CORONA, SANYO, COLUMBIA, VT-XT, ETC.

(Computer names are tradenames and/or trademarks of their respective manufacturers).

To order:

ring (02) 569-3700 or send \$199.00 plus \$7 postage & handling to Video Technology Software Division PO Box 181, Petersham NSW 2049

Mastercard or Bankcard holders

can order by phone

Enclose cheque or money

order with this coupon

DEALER ENQUIRIES WELCOME

Orders delivered overnight

OUR SOFTWARE DIVISION SPECIALISES IN HIGH PERFORMANCE SOFTWARE AT LOW COST.

COMPUTER, PERIPHERAL PRODUCT & SOFTWARE ENGINEERS

VIDEO TECHNOLOGY SOFTWARE DIVISION
17-19 HERBERT ST.,
DULWICH HILL
N.S.W. 2203 AUST.
PHONE (02) 569-3700 (3 lines)
TELEX AA 10715681 VDOT

MAILING ADDRESS
P.O. BOX 181
PETERSHAM N.S.W. 2049
AUSTRALIA

"IN PURSUIT OF EXCELLENCE"

NEW RELEASE
(Available Ex-Stock)

DAC WORD

Powerful Wordprocessing

Package with Spelling Checker

and Form Filer.

\$129.00

Runs on your IBM (PC_{jr}/PC/XT/AT), VT-XT, AT&T, EPSON, TANDY (1000/1200/2000), TI, COMPAQ, CORONA, SANYO, COLUMBIA, ETC.

(Computer names are trade names and/or trademarks of their respective manufacturers.)

I WOULD LIKE YOU TO SEND ME OF THE ABOVE PRODUCTS

NAME

ADDRESS

SUBURB STATE POSTCODE

TELEPHONE

PAYMENT MADE BY:

MONEY ORDER

CHEQUE

CASH

MASTERCARD OR BANKCARD HOLDERS CAN PHONE

ORDERS THROUGH

CARD No.

EXPIRY DATE: SIGNATURE

I WOULD LIKE ANY FURTHER NEW SOFTWARE Yes No

INFORMATION SENT DIRECTLY TO ME

TJ'S WORKSHOP

emphasis on understanding how a particular program works, and an effort to keep programs as portable as possible so that they can be used on other machines. This will allow us to provide programs indirectly for even more machines than we do at present.

The idea is to provide a more comprehensive coverage and to make as much software as possible applicable to as many machines as possible.

This also means that we would like to see a change in the programs you submit. The usual guidelines for submitting programs still hold, but we also require programs to be carefully written with plenty of comments and documentation. Programs should be as structured as possible, with the purpose of any machine-specific parts carefully marked and documented. The easier they are to read and understand, the better, so that our programs and tips can be of use to the owners of a wide variety of machines.

We are interested in what people think about our programming coverage, especially the changes that have been made. Comments on particular programs and the ideas in them would also be welcome, so please write to the address given at the end of Programs; this is also where details of how to submit programs are given. Please try to comply with these as much as possible, and remember to send in a stamped addressed envelope so that we can return submissions. You are welcome to submit programs of any length, but we must point out that we will not accept anything that we think is so long that it would be tedious to type in. Of course, an exceptionally good program would be worth a little extra effort. Machine code and long lists of numbers are particularly unrewarding to type in, and should always be checksummed to eliminate the typing errors that are bound to occur. A commented assembler listing would be highly preferable as it is easier to read and understand.

As it will take some time for these changes to take effect, and for us to start receiving programs more along the lines mentioned above, these improvements will have to be gradual. This will allow us to take your opinions into account, as well as avoid making any mistakes.

```
10 SYMBOL AFTER 200
20 SYMBOL 200,0,&CD,&60,&BB,&32,0,0,&C9
30 x 1 = INT ((HIMEM + 1)/256):x2
   =HIMEM+1-256*x1
40 POKE HIMEM+6,x2:POKE HIMEM+7,x1
```

PASCAL X-AXIS PRINTING

in Turbo Pascal, is self-explanatory and well documented.
A Griffith

This Pascal routine, written

```
program print;
: *****
: Printing program written by *****
: AARON GRIFFITH *****
: *****
: For the IBM PC using TURBO PASCAL *****
: *****
: The program below will print data in any position on the x axis on a printer
:
: PRT(10) ***** Will position the cursor on the paper.
: CHR(13) ***** ASCII value for Carriage return.
: CHR(32) ***** ASCII value for space.
: Writeln(LBT) ***** Clears the buffer.
:
: procedure prt(x: integer);
: var a: integer;
: begin
```

COMPAK

Compak Computer Centre
Just off Nepean Hwy near North Road

LIGHT UP YOUR NEW YEAR WITH BARGAINS FROM COMPAK FOR YOUR APPLE

You don't have to buy a new printer. Just add our NICEPRINT card and you get NEAR LETTER QUALITY on 5 fonts. Full graphics capability. You can dump screen images rotated, enhanced etc. etc. Superscript, subscript, underlined etc., etc. Works with all known Apple II+ or IIe word processors. Operates under DOS 3.3, PASCAL, CP/M.
Only **\$125** including tax.

STRANGLER WITH PRINTER CABLES

Look at our multi-way switch boxes. You can get one printer shared among several computers or a number of printers can be hooked on to one computer.
1 Input 3 Output
Only **\$140** inc tax

VIATEL SOFTWARE

Software for the APPLE and IBM and COMPATIBLES to access VIATEL.
Only **\$77** inc tax

MODEMS

Avtek modems
300, 600 1200 baud with 75 backloop
Handles viatel
Auto answer **\$399** inc tax
Without auto answer **\$365** inc tax
Mini Modem II **\$199** inc tax

DT 32 COPY HOLDER

New improved tougher model **\$33** inc tax.

LOCKABLE DISK BOX

Hold over 85 disks **\$19.50** inc tax

NAKAJIMA NP2200

Features 165 cps, NLQ & 2K buffer **\$565** inc tax

Portable BRIEFCASE COMPUTERS EXECUTIVE 816

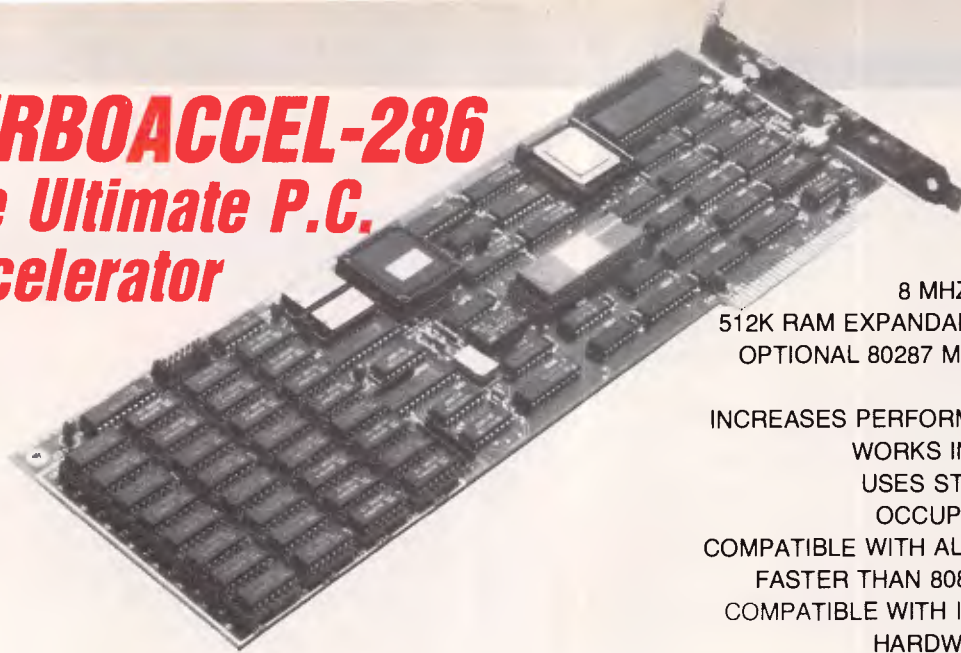
A full business machine with 1.6 megabytes of floppy disk storage and a bundled package of software worth thousands. Includes a full integrated IMS accounting suite, Supercalc 2, Superwriter, Database, Office Time accounting system. Project costing system, etc etc.
\$2395 inc tax

COMPAK carries everything for your computer. When you want printers or monitors or books or stationary or Apple/IBM software — think Compak — think value.

Compak Computer Centre
156 MARTIN STREET,
GARDENVALE, MELB 3185
Telephone: (03) 596 7222

TURBOACCEL-286

The Ultimate P.C. Accelerator



FEATURES

- 8 MHZ 80286 PROCESSOR
- 512K RAM EXPANDABLE TO 1 MEGABYTE
- OPTIONAL 80287 MATH COPROCESSOR
- SWITCH FOR 8088
- INCREASES PERFORMANCE 3 TO 6 TIMES
- WORKS IN P.C. COMPATIBLES
- USES STANDARD 256K RAMS
- OCCUPIES ONE CARD SLOT
- COMPATIBLE WITH ALL P.C. PERIPHERALS
- FASTER THAN 8086, 80186 PRODUCTS
- COMPATIBLE WITH INTEL ABOVE BOARD
- HARDWARE RESET BUTTON

ALL FOR ONLY \$1450 + SALES TAX

APPLICATION

Earth Computer's TurboAccel-286 is a 8 Mhz 80286 based accelerator board designed to operate in P.C. compatible computer systems. It was designed to retain the upmost compatibility with all hardware and software on the P.C. This was accomplished by designing TurboAccel to 'think' like an 8088 when accessing the P.C.'s peripherals.

TurboAccel-286 allows P.C.'s and compatibles to run present applications up to six times faster. It is ideal for manipulating large spreadsheets, scientific number crunching, and computer aided design applications. Any compute bound tasks can be enhanced by TurboAccel-286.

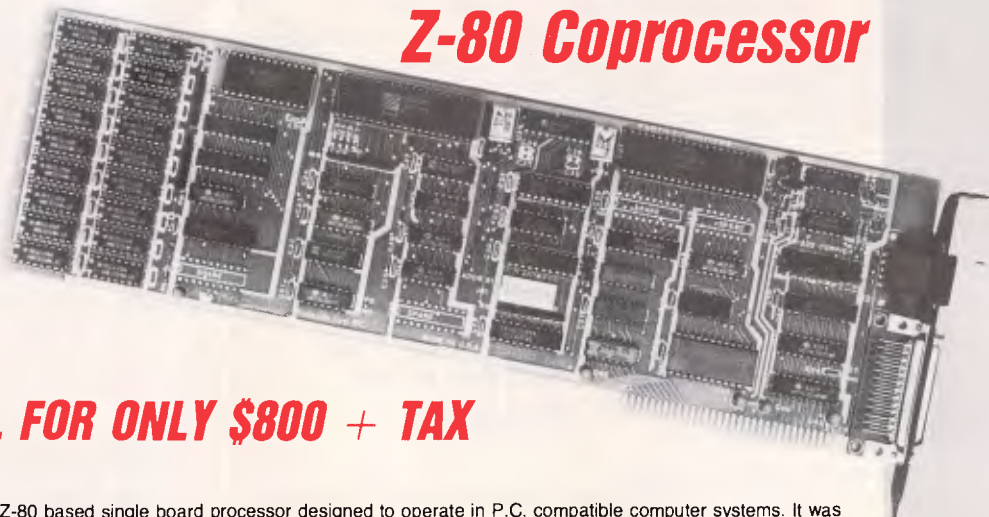
TurboAccel-286 represents an alternative to purchasing an A.T. by allowing you to upgrade to A.T. performance while retaining the software and hardware investment in your P.C.

TURBOSLAVE - P.C.

The World's Fastest Z-80 Coprocessor

FEATURES

- 8 MHZ Z-80H
- 2 RS-232 PORTS, 50-38.4K BAUD
- 128K RAM WITH PARITY
- FASTEST CPM COPROCESSOR
- P.C. COMPATIBLE
- RUN OVER 2000 CPM PROGRAMS
- FULLY DOCUMENTED
- SLR Z-80 ASSEMBLER INCLUDED
- OPEN ARCHITECTURE
- 16 TURBOSLAVES PER P.C.
- TRUE MULTI-USER



ALL FOR ONLY \$800 + TAX

APPLICATION

Earth Computer's TurboSlave-P.C. is a 8 Mhz Z-80 based single board processor designed to operate in P.C. compatible computer systems. It was designed as a high performance coprocessor to allow for use in as many applications as possible including custom user defined tasks.

The large base of CPM software can be run on TurboSlave-P.C. A CPM emulator program is included for this purpose. Applications will run faster in most cases because of the high speed 8 megahertz Z-80 and large memory space.

TurboSlave-P.C. is supported by the TurboDOS operating system (separately purchased option) allowing up to sixteen TurboSlaves to be connected to a P.C., each running a user on a dumb terminal. Each user can run CPM and MPM compatible programs with full record locking security.

TurboSlave-P.C. can be used as a background processor for communications, print spooling, data encryption and a host of other special purposes. Utility software to help develop these applications is included at no charge along with comprehensive technical documentation. A user library of software has been started to share applications as developed.

CALL . . .



HYPEC ELECTRONICS PTY. LTD.

P.O. BOX 438 RYDE
SYDNEY, N.S.W. 2112
AUSTRALIA

TEL: (02) 808-3666, 808-3050
CABLE: "LAMRON" SYDNEY
TELEX: AA71551 LAMRON

TJ'S WORKSHOP

```

write(1st,chr(13));
for a = 1 to 2 do write(1st,chr(32));
end;

begin
prt(10); write(1st,"DATA "); prt(60); write(1st,"DATA ");
writeIn(1st);
end.

```

BBC SECOND PROCESSOR

Frequently, it is necessary to turn off the BBC's second processor to run a piece of software. It is possible to do this from a program using OSBYTE &AE — a routine designed to read the tube presence or otherwise. The OSBYTE call must be followed by a language call, and the tube is always switched back on by a reset.

To switch off the tube, several methods can be used:

- 1) FX 234
*BASIC
- 2) A%=&EA: X%=0:
Y%=0:

```

CALL &FFF4: *BASIC
3) [LDA #&EA: LDX #0:
LDY #0: JSR & FFF4
LDA #&142: LDX #15:
JSR &FFF4]

```

These would usually be followed by a command such as *RUN or *CHAIN, as the instructions to turn off the tube run in the second processor and it is necessary to run any further code in the BBC Micro itself. A typical use would be to turn off the tube when using a disk carrying Basic programs. The !BOOT file might be:

```

*FX 234
*BASIC
*KEY 10*FX
234: M*BASIC:MCHAIN
"MENU":M
CHAIN"MENU"
S Kelly

```



Compak Computer Centre
Just off Napaan Hwy near North Road

GIVES YOU MORE THAN YOU BARGAINED FOR

Specifications:

- * 640k on motherboard
- * Twin 360k drives
- * 8 slots
- * Multi-function card
- * Video card with colour/mono outputs
- * RGB colour
- * RS232 serial (second port optional)
- * Security key to stop unauthorised access
- * Front reset button
- * Parallel printer port
- * Joystick port
- * Light pen port
- * Battery backed up clock

Z-NIX PC/XT



FROM
\$1649
INC

Quality • Quality • Quality

- * Hinged lid for easy access
- * Sculpted ergonomic keyboard
- * 4 layer board for reliability
- * 6 months guarantee (return to base)
- covers both labour & parts —

Optional 20meg hard disks at brilliant prices

Prices from **\$1649!!!!!!**

Includes # all specifications above
sales tax.
does not include monitor

Compak Computer Centre
156 MARTIN STREET,
GARDENVALE, MELB 3185
Telephone: (03) 596 7222



SANYO

Desk-Top IBM- Compatible

INTRODUCTORY OFFER \$ CALL

OFFICE COMPUTER CENTRE PTY. LTD

(02) 923-2466

Featuring switchable 4.77 MHz to 8MHz processor speed with seven available expansion slots

UNBEATABLE SPECIALS

RIGHT THROUGH FEBRUARY

HERE'S HOW:

Just purchase the following BORLAND products and receive BORLAND's SIDEKICK absolutely FREE. That's right InfoWorld's Product of the Year and your most useful companion ABSOLUTELY FREE!

- ★ TURBO PASCAL \$105.00
- ★ TURBO DATABASE TOOLBOX \$ 96.95
- ★ TRUBO GRAPHIX TOOLBOX \$ 99.95
- ★ TURBO TUTOR \$ 67.95

you receive ...

- ★ SIDEKICK (RRP \$99.95) FREE!

OR

Purchase the following BORLAND PRODUCTS and receive SIDEKICK at HALF PRICE!

- ★ TURBO PASCAL \$105.00
- ★ TURBO GRAPHIX TOOLBOX \$99.95

and receive ...

- ★ SIDEKICK (RRP \$99.95) \$49.97



FREE SIDEKICK

circles, rectangles and a full range of geometric shapes. Functions that will plot curves — tools that will create animation — and much more. \$99.95.

SIDEKICK gives you a notepad, dialer, phone directory, perpetual calendar & datebook, and ASCII table right at the press of a key. No matter what software you're using, your sidekick's always there. Notepad is a full-screen editor with word-wrap, paragraph editing, date-stamping and much more. \$99.95 or it's yours FREE or HALF PRICE with the above offers.

AND NOW YOU CAN ADD TWO MORE GREAT PRODUCTS TO YOUR TURBO FAMILY:

TURBO GAMEWORKS: Chess, Bridge and Go-Moku, complete with source

code and a 200-page manual. Just \$105.00

TURBO EDITOR

TOOLBOX: All the building blocks to make your own editor and word-processor, complete with source code and a 200-page illustrated manual. Just \$105.00.

AND TWO MORE GREAT BUSINESS PRODUCTS FROM BORLAND:

REFLEX: If you use Lotus, dBase or pfs:File, you need REFLEX. REFLEX is the first database that probes relationships — then shows them to you in various graphic forms — scatter, line, bar, pie. With Reflex you can SEE relationships. "Our sales graph peaked in December. SHOW me the data that caused that peak". Unbelievably priced at just \$199.95 — for a limited period only.

TURBO LIGHTNING: Has to be seen to be believed! TURBO LIGHTNING is everything that your wordprocessor needs. A complete dictionary and thesaurus on-line. No messy proof-reading — Lightning will beep whenever you make an error WHEN YOU MAKE IT! And TURBO LIGHTNING will automatically correct the error — you don't have to retype! The thesaurus is always at your fingertips, and LIGHTNING will retype your alternative word. That's what computers should be all about. \$199.95.

This limited offer is available until February 28, 1986 or while stocks last. Offer available for IBM PC and compatible computers only. All prices quoted are Recommended Retail only.

TURBO PASCAL v3.0 combines the fastest Pascal compiler with an integrated development environment. \$105.00

TURBO TUTOR teaches you step-by-step how to use Turbo Pascal with commented source code for all programme examples on diskette. \$67.95

TURBO DATABASE TOOLBOX offers three problem-solving modules for your Turbo-Pascal programmes: Turbo Access, Turbo Sort complete with source code, and GINST which generates ready-to-run installation programme that lets you forget adapting your software to specific terminals. \$96.95.

TURBO GRAPHIX TOOLBOX provides full graphics window management for your programmes — tools that will allow you to draw and hatch pie charts, bar charts,

Software Source Pty Ltd

344 OXFORD ST, BONDI JUNCTION (02) 389 6388

CALL SOFTWARE SOURCE
(02) 389 6388
FOR THE NAME OF
YOUR NEAREST DEALER

READING A CHARACTER FROM THE AMSTRAD SCREEN

There is no facility provided directly from Basic on the

Amstrad to test a location on the screen and return the value of the character found there. Such a facility is available to test pixels on the graphic screen and return the ink colour of a particular pixel. There is, however, a machine code call to do this within the operating system, which is presumably used by the Copy cursor.

To make use of this routine from Basic, a seven-



Choice

YOUR
NATURAL CHOICE
FOR

NEC APC III

Lotus-123,
Framework, DBase
III, Multimate &
other IBM software

Now the difference
between IBM PC
& NEC APC III is
just the \$\$\$!

(NEC costs less)



The NEC solution to IBM
compatibility is the
"SLE BOARD"

FOR INTRODUCTORY OFFER:

Choice will provide absolutely free
an "SLE BOARD" with every purchase
of a NEC APC II. Value at \$525 inc

*Talk to us also about your office
Automation, Accounting Solution
or School Administration System.*

NEC AUTHORISED DEALER

CHOICE SYSTEMS PTY LTD

123 Whitehorse Road, Deepdene, Victoria 3103
Telephone: (03) 817 6133; (03) 817 6134;
(03) 817 6132; (03) 817 2153

MICRO-PRO COMPUTERS

PERICOM ENGINEERING CO

43 Atherton Road, Oakleigh, Victoria 3166

***** ALL PRICES INCLUDE SALES TAX *****

PC/XT SYSTEM I

\$1390

640K RAM-dual disk drive, colour graphics video card, 2 serial/1 parallel port, joy stick port, real time clock, 150 watt power supply.

PC/XT SYSTEM II

\$1240

256K RAM single disk drive, colour graphics video card, 2 serial/1 parallel port, joy stick port, real time clock, 150 watt power supply.

PERIPHERALS

Hercules Graphic Cards	\$ 199
512K RAM cards OK RAM	99
Multifunction Card OK RAM	199
Video cards	169
RAM chips/per 64K	19
RAM chips 256K	79
Drives 5" 360K PC	249
Drives 5" Slim Apple	199
Drives 5" Fat Apple	209
IBM Disk Controller	139
IBM Hard Disk Controller	399
Controller for Apple	75
Mouse	197
Joystick	45
Centronic Cable	29
Z80 Cards	79
Parallel printer card	89
Grappler card	83
80/40 column card	120
16K RAM cards	89
128K RAM cards	180
R.G.B. colour cards	82
PAL colour cards	82
Clock cards	163
Speech cards (SAM)	55
Eprom burner 16, 32, 64	92
Super serial RS232	125

MODEMS

\$199-\$495

V21-V23 Bell 103-203 connects to bulletin boards, 300 full duplex, connects to Viatel 1200/75

V21-V22, 300-1200 full duplex auto answer dial (hayes)

BAUD RATE CONVERTER

Splits baud rate to allow connection to Viatel **\$ 200**

SOFTWARE

DBase III	\$ 795
Lotus 1-2-3	799
Symphony	850
Wordstar pro	595

MAINTENANCE

Extended warranty 12 months on computer **\$ 175**

MONITORS

12" green screen	\$ 195
12" Taxan SuperVision III	770
14" D.T.X. R.G.B. monitor	449

PRINTERS

Daisy Wheel (Brother)	from \$ 450
80 col. dot matrix	from 399
132 col. dot matrix	from 700

HARD DISK DRIVES

10 meg with controller	\$ 999
20 meg with controller	1350

Phone 03 568 6911, 03 569 5450

Telex No 32679 (Basis)

*IBM is a registered trademark of International Business Machines
Apple is a trademark of Apple Inc.

TJ'S WORKSHOP

byte machine code routine is needed. A good place to locate this is within the first user-defined graphic position, which always starts one byte above HIMEM so can be easily located.

The technique used is to write in the routine using the SYMBOL command, ensuring that the number used is the same for the SYMBOL AFTER command which sets up the table of characters. The first byte of the SYMBOL character is used to store the character which is read in from the screen. Some juggling is needed to get the address of this byte into the code; lines 30 and 40 of the program do this.

The SYMBOL 200 used here is quite arbitrary. If you are not defining any characters for your program, you could make it SYMBOL AFTER 255 to economise on memory.

To use the routine, LOCATE to the position you want to test, CALL HIMEM+2, then PRINT PEEK (HIMEM+1) which yields the character number found. PRINT CHR\$(PEEK (HIMEM+1)) will print out the actual character.
J Durst

```
10 SYMBOL AFTER 200
20 SYMBOL 200,0,&CD,&60,&BB,&32,0,0,&C9
30 x1=INT ((HIMEM+1)/256):x2=HIMEM+1-256*x1
40 POKE HIMEM+6,x2:POKE HIMEM+7,x1
```

MACHINE LANGUAGE CALLS

This simple VZ200/300 routine can save programmers from using lots of POKE commands in a Basic program when calling a lot of machine code sub-routines.

Conventional method:

To call the address 13392 & 13404

```
10 POKE 30862,80:POKE 30863,52
```

```
20 x=USR(0)
```

```
30 POKE 30862,92:POKE 30863,52
```

```
40 X=USR(0)
```

New method:

```
10 X=USR(13392):
```

```
X=USR(13404)
```

Main program:

```
0 POKE 52992-65536,58:
```

```
POKE 52993-65536,33
```

```
1 POKE 52994-65536,
```

```
121:POKE 52995-
```

```
65536,50
```

```
2 POKE 52996-65536,13:
```

```
POKE 52997-65536,207
```

```
3 POKE 52998-65536,58:
```

```
POKE 52999-65536,34
```

```
4 POKE 53000-65536,121
```

```
:POKE 53001-65536,50
```

```
5 POKE 53002-65536,14:
```

```
POKE 53003-65536,207
```

```
6 POKE 53004-65536,195
```

```
:POKE 30862,0
```

```
7 POKE 30863,207
```

APPLE HI-RES SCROLLER

This routine scrolls the hi-res screen in any one of four directions. To use it, type in the listing (assuming you know how to use the system monitor, if not then refer to chapter 3 of the Apple II Reference Manual) and save

it by typing BSAVE SCROLL, A\$300,L\$8B. There are four different calls for scrolling:

```
CALL 768 — scroll up
```

```
CALL 777 — scroll down
```

```
CALL 838 — scroll left
```

```
CALL 873 — scroll right
```

To scroll page 1 do a POKE 230,32 and to scroll page 2, POKE 230,64. Note that when scrolling left and right, the routine scrolls

Choice



Authorised Dealer

YOUR NATURAL CHOICE FOR "APPLE HARDWARE & SOFTWARE"

February Special:
Macintosh 128K to 512K Upgrade for \$395



800K Double sided Mac External Drive for \$545 inc tax

Ask about upgrades on Macintosh:

1. Upgrade from single sided 400K to double sided 800K disk and add the new 128K ROM. Dramatic speed increase and fewer disk hassles.
2. Turn your "Fat Mac" into a "MegaMac". This can only be done on machines with the 128K ROM.
3. If you have a 128K Mac or a illegitimate "Fat Mac", your cost to a MegaMac is only a little more.
4. How about a keyboard with inbuilt numeric key pad and cursor key movement keys.

CHOICE SYSTEMS PTY LTD

123 Whitehorse Road, Deepdene, Victoria 3103
Telephone: (03) 817 6133; (03) 817 6134;
(03) 817 6132; (03) 817 2153

FANTASTIC TOSHIBA T1100 OFFER



With every TOSHIBA 1100 IBM-PC COMPATIBLE PORTABLE purchased from THE WORDWORKS we will supply **FREE** an extraordinary bonus item that will save you nearly \$1000. Phone us for details.

And this on top of the TOSHIBA 1100's amazing standard features: 80 x 25 lcd screen; 256K CMOS RAM; 720K 3½" on-board disk drive; Centronics printer port; rechargeable batteries, c. 8 hour life; monochrome/colour monitor ports — and all for an unbelievable

\$2,995 (including tax)

OLYMPIA NP 165 Matrix Printer with Brilliant Near Letter Quality Mode **\$599.**

ACCESSORIES KIT (a necessity): External ac/dc mains power pack (18 volts, .6 amp dc output) **\$49**; MS DOS system disk (includes RAM disk) **\$95**; manuals set **\$57** — total **\$201.**

RS232C card \$145; extra 256K CMOS RAM card **\$649**; Monochrome external monitors from **\$219**; Kaga Vision III colour monitors **\$899**; Multimate word processor **\$695**; Wordstar 3.3 **\$399**; Wordstar 2000 **\$595**; Microsoft's Word **\$499**; Open Access **\$899**; Spellbinder Scientific wp **\$1,095**; ENABLE integrated package phone for price; Word Perfect **\$685.**

ANOTHER AMAZING SPECIAL

Wordworks own 5¼in Disk Drive with elegant case, power supply and cable, for the Toshiba T1100
\$599 incl tax.

I enclose a cheque/postal note for the Toshiba 1100 PORTABLE w. FREE BONUS ITEM (**\$2,995**) plus Accessories Kit (**\$201**) making a total of **\$3,196** for the package.

My cheque/postal note also includes \$..... for the following additional accessories:

Name Address:

Postcode:

Telephone:

 **THE WORDWORKS**, The Boulevard Lawns, City Walk, Canberra City ACT 2601. Telephone (062) 572893; (062) 477739.

TJ'S WORKSHOP

seven pixels at a time and is a bit jerky, this is because of the way Apple handles color graphics (if it scrolls one pixel at a time, you are most likely to get changing colors each time the screen scrolls due to the color mapping technique used in Apple IIs). Also, for those who don't know it, here are the screen display switches:

To use it POKE <address>,0
 For example: POKE 49232,0:POKE 49235,0:POKE 49236,0:POKE 49238,0 would display page 1 of hi-res graphics with 4 lines of text at the bottom (similar to HGR command but without clearing the picture that is already there).
A Lim

ADDRESS	FUNCTION
DEC HEX	
49232 (\$C050) —	GRAPHICS
49233 (\$C051) —	TEXT
49234 (\$C052) —	FULL GRAPHICS
49235 (\$C053) —	GRAPHICS AND TEXT
49236 (\$C054) —	PAGE 1
49237 (\$C055) —	PAGE 2
49238 (\$C056) —	LO-RES
49239 (\$C057) —	HI-RES

```

0300: A2 E6 A0 C0 A9 00 4C 0F 03 A2 C6 A0 FF A9 BF 8E
0310: 22 03 8C 2B 03 85 08 20 11 F4 A5 26 85 06 A5 27
0320: 85 07 E6 08 A0 00 A2 00 A5 08 C9 BF FO 20 11
0330: F4 A0 27 B1 26 91 06 88 10 F9 4C 1A 03 8A A0 27
0340: 91 26 88 10 FB 60 A9 00 85 08 A2 00 A0 00 20 11
0350: F4 C8 B1 26 88 91 26 C8 CO 27 DO F5 A9 00 91 26
0360: E6 08 A5 08 C9 CO DO E2 60 A9 00 85 08 A2 00 20
0370: 11 F4 A0 26 B1 26 C8 91 26 88 88 10 F7 A9 00 A8
0380: 91 26 E6 08 A5 08 C9 CO DO E3 60
    
```

Now is the Time



For Macintosh Plus.

*We already know it inside out!
 Limited quantities of Macintosh
 Plus now available at:*



292 Canterbury Road
 Surrey Hills
 Victoria 3127
 Ph (03) 830 4555

Your Specialist Macintosh™ Dealer

Authorised Apple Dealer
 Apple is a trademark of Apple Computer, Inc. Macintosh is a trademark licensed to Apple Computer, Inc.

CALCUTRONIC PTY. LTD.

THE CALCULATOR & COMPUTER CENTRE.

CALCUTRONIC PTY. LTD.

CALCUTRONIC PTY. LTD.

ATARI	520ST	IS HERE NOW
ATARI	130XE 128K	IS HERE NOW
HUGE RANGE ATARI SOFTWARE	LARGE RANGE MSX COMPUTERS	MSX SOFTWARE

**ATARI 130XES NEW IN STOCK AND AVAILABLE.
 COME AND SEE THE ATARI AND MSX SPECIALISTS.
 797 Glenferrie Rd, Hawthorn Victoria 3122 Phone (03) 818 6631**



1029 Mt. Alexander Road
 ESSENDON, VIC. 3040
 (03) 379 6808

NEW YEAR SALE



Apple IIC Package — Including over \$500 FREE Software Reduced from \$2,295 to **\$1,990**

Macintosh 512K — With the New Imagewriter II Colour Printer R.R.P. \$5,605 SALE PRICE **\$4,195**

(Above Prices Only Whilst Stocks Last)



128K — With 1570 Disk Drive and 1901 RGB Colour Monitor Reduced from \$1,800 to **\$1,630**

PC10 (Runs all IBM Software) Was \$3,240 NOW **\$1,980**

The AMIGA is Coming Soon (Orders Taken Now)



Full Range of Epson Printers — From the GX 80 (Commodore/Apple Compatible) to the SQ2000 Ink Jet.

Portable and Desk Top Computers Inc.
 (ALL 10% OFF) — PX8, QX11, QX16 and the New Epson PC

FREE SOFTWARE

SPECIAL SELECTIONS FROM THE PUBLIC DOMAIN (02) 29 2866

Well, almost free. We don't charge for the public domain software but there is a small all-inclusive service charge of \$15 per disk to cover promotion costs, copying, postage, etc. Disks are available for CP/M and MS-DOS and APPLE. Mail and telephone order only.

The programmes have been carefully selected, tested and documented. They'll run on a wide variety of computers that accept 5¼" disks. Most of the programmes are machine independent and will run as is. In some cases (such as modem/communication programmes) it is necessary to indicate the sort of terminal being used. Where minor changes are required to customize a programme, source code is usually provided. Testing has been carried out for CP/M disks on a Z80 Kaypro II.

About 120 different formats are supported, including Kaypro, Osborne, Tandy and Microbee, Televideo and Apple II, but not Commodore 64

(We have many more disks than we can list here. Please ring or write for our free catalogue. Purchasers of the disks below will receive it automatically.)

CP/M

DISK No.

- CP1 GAMES.** Menu-driven, compiled games, including an excellent one that prints bio-rhythm charts, a clever horse race, and a space trader programme for the wheelers and dealers.
- CP2 GAME.** A 191k version of Adventure, the classic game which can absorb your attention for days at a time. This is a 550 pt version with an expanded cave and smarter creatures.
- CP3 GAMES.** More fascinating games to absorb time you can't spare — such as a six level chess game, Othello, a well-written multi-level version of Pacman and an extensive Wumpus adventure game.
- CP4 GAMES.** Some outstanding games written in Mbasic, with source. Includes golf, a hunting game (like space invaders) called Duck where the ducks fight back, and a super adventure game where you can choose your personal strengths. Also contains a keyboard translator like Smartkey.
- CP21 UTILITIES.** A whole heap of useful programmes to catalogue your files, arrange the directory display, make emergency alterations to the disk, allow printing and computing at same time, count words, print the screen, copy better, erase, unerase, delete, make batch commands, etc.
- CP23 Z80 MACRO ASSEMBLER.** The syntax closely follows RMAC and MAC. A bargain at a fraction of their cost.
- CP25 Z80 DISASSEMBLER.** Includes DASM, an easier to use version of ZZSOURCE, and XLATE, a very good 8080 to Z80 translation routine. Source and documentation are included.
- CP28 UTILITIES.** A super collection of some of the best utilities available, such as NEWSWEEP, NULU (file library), SUPERZAP and VDO-KP.
- CP29 EZCPR.** Whereas ZCPR is a famous replacement for CP/M with fancy tricks that will keep you from returning to CP/M, EZCPR is a much easier to install lookalike for ZCPR that works on just about any system. Well worth having.
- CP61 MX80 PRINTER GRAPHICS.** A comprehensive graphics package for those with Epson MX-80 printers and look alikes. Includes sample files.
- CP81 LANGUAGE — FORTH.** This is the famous F83, which adopts the latest Forth standard. Has built-in editor, compiler, etc.
- CP82A LANGUAGE — SMALL C COMPILER, VERSION 2.1.** Inexpensive way of learning to use C. A published handbook is widely available.
- CP83 LANGUAGE — SMALL C LIBRARY.** Contains 105 C functions, many described in Jim Hendrix's "Small C Handbook". A lot are written in assembler and most are OK for any CP/M system.
- CP101 COMMUNICATIONS. TURBO PASCAL BULLETIN BOARD.** A complete bulletin board package that has been highly praised by users.
- CP102 COMMUNICATIONS. MDM730.** A popular and widely used system. Easily adapted to different machines. Source code and extensive documentation is included. An Apple/CPM version is also available.
- CP141+ DBASE II APPLICATIONS.** A powerful collection of 5 disks with fully developed applications packages, programme extensions, and algorithms. Includes super mail-management, inventory control, phone tracking, budgetting, graph-making facilities, patches, checking for duplicate entries, menu creation, and many more. \$50 the set instead of \$75.

MS/DOS

- M1 GAMES.** Includes a graphic, conversational and intelligent adventure game as well as a Star Trek-type adventure and a surprise called Bouncing Baby.
- M2 GAMES.** Fifteen Pascal games compiled with source code. There is also a musician programme so that you learn about music while you write songs and a programmer's calculator which shows the internal workings of stack, memory, and registers.
- M3 GAME. ADVENTURE.** You guessed it, the original classic written in C with source. Compiled for immediate play.
- M21 UTILITIES.** These are essential and include file maintenance superstars like SWEEP and WASH as well as library and squeeze/unsqueeze programmes. Lots of them.
- M22 UTILITIES WITH ASSEMBLER/DISASSEMBLER.** Has a ramdisk programme, print while you work spooler, wordstar converter, as well as assembler/disassembler.
- M23 UTILITIES.** Make life easier for yourself with programmes like Util, Z, Vtype, ST, Protect, Unprotect.
- M24 UTILITIES.** Ultra Utilities can unerase files, patch, optimise Basic source code, generate Basic code for custom data bases, and more.
- M26 UTILITIES FOR PERSONAL MANAGEMENT.** Similar to Sidekick, these are background utilities that provide calculator, notepad/editor, phone index, alarm clock, calendar, printer controls, typewriter simulator, window access to directory, display/remove/copy/rename files, etc.
- M41 WORD PROCESSOR.** Considered at least as good as the commercial programmes. Contains PC-Write latest version (2.55) plus extensive manuals. For editing and formatting.
- M81 LANGUAGE. FORTH.** This is F83, the latest standard, with built-in editor, compiler, etc.
- M82 LANGUAGE. SMALL C:PC VERSION 1.1.** Ron Cain's compiler for those interested in learning the C language.
- M83 LANGUAGE. XLISP VERSION 1.5.** An experimental language with object-oriented extension capability. Used in artificial intelligence programming, etc. CPM80 version also on hand.
- M101 COMMUNICATIONS. MODEMS.** Two major communication programmes—Qmodem and Kermit. Lots of bells and whistles.
- M102 COMMUNICATIONS. SINGLE-USER BULLETIN BOARD.** Source included. Set up your own message service.
- M121 GENERAL LEDGER ACCOUNTING.** A small-business recording system.
- M122 SPREADSHEET CALC.** A comprehensive programme for budgetting, projects, "what if" calcs etc. Good documentation on disk. Suit home, school, small science/engineering/accounting uses.
- M123 INVESTMENT RECORD SYSTEM.** See how your money grows and how to keep track of it. Puts order into your finances and keeps track of costs, income, profits, losses, etc.
- M124 STOCK MARKET ANALYSER.** Extensive programme that helps you to "think and grow rich". All sorts of analyses included.
- M142+ DBASE II/III APPLICATIONS.** Extensive group of Dbase applications, programme extension and algorithms. Includes cheque programme, mail management, inventory control, budgetting and accounting, memo maker, phone index, menu drive, typewriter simulation, depreciation, automatic formatting, search for duplicate entries, Spanish lessons, runtime decoder, graphics and other utilities. Set of 5 for \$50 instead of \$75.
- M143 FAMILY TREE/GENEALOGY.** Extensive programme in Basic for recording, tracing, grouping, printing, etc., family relationships.

APPLE II

Ring or write for free catalogue.

PUBLIC DOMAIN NEWSLETTER

For news, reviews, views and how to use public domain software subscribe to our bi-monthly newsletter and keep informed on the free programmes that help your computer to serve you. Only \$15 per annum. Includes updates to catalogue.

ORDERS:

*Each disk costs \$15 including postage.

*The Public Domain Newsletter costs \$15 per annum and is issued bi-monthly.

PAYMENT BY MAIL TO: Box C343 Clarence St, PO, Sydney NSW 2000.

TELEPHONE ORDERS: Pay by Bankcard, Mastercard or Visa. (02) 29 2866.

OFFICE: 3 Barrack St., Sydney. NSW.

PLEASE INDICATE THE DISK FORMAT REQUIRED WITH AN ALTERNATIVE FORMAT IF POSSIBLE.

SELECT SOFTWARE

Mail And Telephone Order Only.

We cannot guarantee the suitability of public domain/user-supported software for users' needs or equipment.



SCREENTEST

All at C?

Last July we compared two C languages, one American and one Australian. This issue Mike Liardet evaluates two new C interpreters, one American and one British, designed to provide a single complete environment in which to run and debug C programs.

One of the main difficulties with C is that its normal development environment involves all sorts of incidental complexities which have nothing to do with the language itself.

Typically, to develop a C program, it is necessary to wrestle with the intricacies of compilers, link loaders, program libraries, text editors, cryptic or non-existent error messages and non-existent debugging facilities.

During the last decade, generations of programmers, sitting idly watching a lengthy C compilation, must have mused over the possible delights of combining the convenience of Basic with the raw power and other features of C. Finally, a number of C language developers have responded to this need.

Firstly, some of the established C compilers have been greatly enhanced to include sophisticated debugging facilities: for example, from de Smet and Mark Williams.

The idea behind these new C interpreters is to provide a single complete environment in which it is very easy to create, run, modify and debug a C program. The price of this simplicity is a loss of efficiency, so the program does not run at the customary C speed. However, this loss of speed is shared with all other programming language interpreters, and should not be a major drawback as the interpreters are all claimed to work with 'standard C'. This means it should be relatively simple to take a working program from an interpreter, and for the final version, just compile it with one of the many excellent C compilers.

Most of the C interpreters currently on offer are for the IBM PC and compatibles.

Products include Living-C from Living Software Ltd in Britain, and RUN/C and INSTANT-C which are both imported from the US by Fagan Microprocessor Systems. For this review I have chosen to take a closer look at two contrasting products: RUN/C and Living-C. I shall not assume any prior knowledge of C, and will be looking particularly at their editing and debugging facilities as these are the areas where they can be most beneficial to the C newcomer.

RUN/C

RUN/C is a US product produced by a company called Age of Reason Co, and was written by Steven Walton, a software author with a number of products behind him — ranging from games to expert systems. It is supplied with an awesome 500-page, A3-size manual, and a single disk with over 100 files.

The 'getting started' instructions are right where they ought to be — on page 1-1. The disk is not copy-protected and it is simple to make a back-up copy of it before starting. Once this is done, RUN/C can be invoked by simply typing 'RC' in response to the DOS prompt. The RUN/C program is quite large, 130k, so it takes a few seconds to load.

As soon as RUN/C is loaded, the screen clears to give a copyright message, the number of bytes of free memory and the command prompt 'OK'. Sounds familiar? Well, anyone who has used Microsoft Basic should immediately feel at home.

RUN/C comes with 107 demonstration programs. To run one of them, simply type:

```
LOAD filename  
RUN
```

This should make Basic fans feel even more at home. In fact, a great deal of the RUN/C interaction emulates that of a Basic interpreter (see Fig 1 for a summary of all RUN/C's Basic-like commands.) And, for all the difference so far, we might as well be working in Basic. Once the program stops running, you can view the source code by typing — yes, you guessed it — LIST. But now you will see some differences from Basic. Although the familiar Basic-style line numbers are present, everything else looks strange. Of course, the contents of each line is C code and not Basic code.

In spite of a manual running to 500 pages, there is no formal C tutorial as such. There is, of course, a tutorial introduction to RUN/C, and a lot of valuable information for the C newcomer, but anyone learning C would be advised to use RUN/C in conjunction with a tutorial text. The manual lists 14 possibilities, including the definitive *The C Programming Language* by the originators, Brian Kernighan and Dennis Ritchie.

It should be relatively straightforward to take a sample program from any one of the recommended texts and enter it into RUN/C. For example, Fig 2 gives the complete command sequence for entering Kernighan and Ritchie's Fahrenheit to Centigrade program. The 'OK' and line numbers are generated by RUN/C, and the rest is typed by the user.

Notice the format of the comment in lines 1 to 5 of Fig 2. An idiosyncrasy of RUN/C is that multi-line comments can only be written with an isolated '/' at the start and a matching isolated '*' as a ter-

DID YOU KNOW?

LOOK!

PRINTERS

RITEMAN plus (A1).....	\$440
RITEMAN plus for Apple IIc.....	\$559
RITEMAN 15 160cps 132 col.....	\$999
OLYMPIA NLQ 165cps.....	\$490
BROTHER M1509.....	call
EPSON LX80 + TRACTOR.....	\$475
HP Inkjet.....	\$899
HP Laserjet.....	\$4999
Citizen MPS 15 (160 CPS).....	\$792
Citizen MPS 20 (200 CPS).....	\$789

MODEMS

300/1200 external + cable.....	\$250
Apple/IBM plus Viatel S/W.....	\$399

MONITORS

Qubie HR31 200 colour.....	\$699
Qubie HR39 Green TTL.....	\$265
Taxan KX-1212 TTL green.....	\$265
Taxan KX-1201 green.....	\$228
Supervision III.....	\$699
All other Taxan products.....	call

IBM

Qubie multifunction 6PAK 64K.....	\$386
384K multifunction card.....	\$325
Colour graphics card.....	\$169
Joystick card.....	\$55
Memory card 512K.....	\$195
8087 5MHz co-processor.....	\$295
10MEG tape drive (internal).....	\$1184
10MEG tape drive (external).....	\$1599
10MEG Tandom hard disk..... fr.	\$1090
Intel Above Board.....	\$649
Hercules Graphics Board.....	\$714
Printer buffer 64K.....	\$349
Not listed.....	call
20 Meg Seagate H/Disk.....	\$1280

APPLE

Ext. 80 column card.....	\$99
SAM voice card.....	\$49
Serial card.....	\$93
Z80 card.....	\$50
Printer interface + cable.....	\$56
Apple IIe compatible drive.....	\$195
Apple IIc compatible drive.....	\$295
128K RAM card & software.....	\$149
Lots of other cards.....	call

SOFTWARE

For all types of software..... call

Prices include sales tax.
For products not listed, call!

- That we have 5 years micro experience and 20 years business experience?
- That our managing director was trained by one of the world's largest computer companies?
- That we have authored computer books published internationally?
- That we have our own repair and service facilities?
- That we can give you the support and service only a computer store can?
- That our prices are the most competitive around?
- That our corporate customers are among the biggest in Australia?

For products, service and advice, get it right the first time — call Computer Haven!

AUTHORISED OLIVETTI DEALERS FOR YOUR BEST PRICE EVER, CALL!



KAGA TAXAN MONITORS

These are high quality Japanese video monitors made by the most respected manufacturer in the industry. Excellent resolution. **\$165**



RITEMAN C+

"The printer of my dreams"

— Australian Commodore Review

- 100% Commodore compatible (no interface required)
- 105cps
- Tractor/friction feed
- Compressed/italics/reverse, etc.

\$475

SUPER MODEM

- Best value we've seen
- 300/600/1200 baud
- Viatel 1200/75 or 75/1200
- US & world standards
- Auto answer/disconnect
- Commodore version includes Viatel software

RS232 version **\$279**
Commodore version **\$295**



\$299

ADMATE DP-80

- EPSON COMPATIBLE
- 80 CPS
- SQUARE PIN HEAD
- TRACTOR & FRICTION
- MADE IN JAPAN

COMPUTER HAVEN

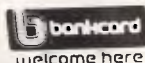


A DIVISION OF MALABAR TRADING PTY. LTD.
INC. IN N.S.W. SINCE 1966

183 MAROUBRA RD.,
MAROUBRA. NSW 2035

TEL: (02) 349-2366
(02) 349-2600

MAIL ORDER FACILITY



OR SIMPLY PHONE

Prices subject to change without notice.

SOURCE • JEDKO GAMES • CICADA • MICRO GENERAL • DATANETCOMM • TECO • QUBIE • CANON • IBM • APPLE • ZENITH • OLIVETTI • C-ITOH • SHUGART • RITEMAN •

IMAGINEERING • ARCOM PACIFIC • DIGITAL RESEARCH • ASTON TATE • EPSON • ACT • TANDOM • XIDEX • OZISOFT • CORVUS • HEWLETT PACKARD • SOFTWARE SOURCE •

VERBATIM • CRS • BROTHER • LINGO • BMC • NEC • OLYMPIA • 3M • ACCOUNTSOFT • STAR • ANTECH • LOTUS • DIGITAL

MagicPrint

The basic program, **MagicPrint**, performs all the print formatting functions. Simple dot commands give you precise control over document appearance with none of the "guessing" of on-screen rulers.

■ Perfect Proportional Spacing

This paragraph is printed in Courier font, without proportional spacing. Every letter is given the same amount of space, just as WordStar would print it. It's easy to see why true proportional spacing is essential for professional-looking documents. But...

Not all proportional spacing is created equal. Other proportional spacing programs leave unsightly gaps between words or pepper the text with hyphens. Only MagicSeries takes all the elaborate steps of a skilled typesetter to upgrade your printer from an electronic "typewriter" to a professional typesetting system. (One user in Idaho saved enough in typesetting costs on a single job to retrieve the entire price of the program.)

■ Automatic Footnoting

Just type in the footnotes with the related text, and the program will put them in the proper place at the bottom of the page. Or, if they are too long, the program will split them and carry the remainder over to the next page. You can mark footnotes any way you like—with numbers, "*", or a "see note" message. Footnotes have never been easier or more flexible.

■ Automatic Column Printing

A simple dot command is all you need to turn a block of text into neat columns. For example, **K2 3** printed this paragraph in two columns with three spaces between them. You can print

columns in various configurations, print only a segment of the text in columns, or even carve out a "window" in the middle of a paragraph for photographs and illustrations.

MagicSeries even lets you "talk" to your printer.

The program relays your instructions directly to the printer to access the extra characters on printwheels, change type fonts or even draw fancy math formulae:

$$M(N-X) = \frac{n-m}{x-y}(y+z)^2$$

Other Major Features

- multi-line headers/footers
- proportional/fixed outdent
- multi-tray sheet feeder control
- instant margin setting
- "widow/orphan-line" control
- left/right indent
- variable super¹ super² super³ sub₁ sub₂ sub₃ scripts
- global pitch variation
- local pitch setting (kerning) merges two characters (æ) or turns -- to -
- text preview on the screen
- boldface, ~~strikeout~~
- SOLID or B R O K E N underlines
- left/right flush for partial lines
- precision centering
- print-time format changes

Stretch partial lines out to the margins
... plus much more

MagicSeries for Laser Printers

At last, MagicSeries puts high-quality desktop publishing within the reach of even the smallest businesses. With a laser printer, full control over text appearance and layout is at your fingertips.

FMS

95 Canterbury Rd, Middle Park, Victoria 3206.

Telephone: (03) 699 9899. Telex: AA 31604.

At any time during the execution of a program, it can be interrupted by pressing the Ctrl and C keys. This results in a short message, stating at what line number the program was interrupted, and then a menu of four options: to continue or abort execution, and to print or display the values of all currently active variables. The active variables are not only the variables in the currently executing function, but also global variables and variables in the function that called the current function, and the function that called that, and so on.

The display of active variables is broken down into a list of global, current function and other variables, but no other indication of their location in the program is given. This can be somewhat confusing if the same variable name is used in different or recursive functions — a quite common and legitimate use of C.

For simple numeric variables the name, type and value is given, but for structures and pointers, no information is given on the value. Structures and pointers are used extensively in C programs, so this is an irritating oversight. However, RUN/C does feature the option to have 'pointer protection'. Pointer bugs are analogous to Basic PEEK and POKE bugs, and can easily crash the system or cause mysterious problems elsewhere, which can be very difficult to pinpoint. The protection facility, which prevents pointers straying out of range, can be invaluable. (For C novices: a 'structure' is rather like a record in a database, where various items are

packed together and accessed by 'field names'.)

Another debugging facility is the TRACE command, which displays the value and type of every variable each time it is accessed. Needless to say this is extremely verbose, and cannot seriously be used for anything but the shortest of programs.

The TRON command is analogous to TRACE, but lists every line as it is encountered, instead of the variables. And finally there is a 'profiler' facility. If profiling is enabled, then using LIST after a RUN gives an augmented display including the number of times each line was executed. This can be especially useful for spotting fragments of code which you expect to be executed, but are missed altogether due to some bug.

In summary, RUN/C's debugging facilities are a considerable improvement on most C compilers, but not as good as the Basic it seeks so hard to emulate. In common with Basic, there is no 'single-step' facility for executing a line at a time — a very useful debugging tool. But in contrast to most Basics, it is not possible to selectively 'print' variables in command mode; neither is it possible to embed the debugging commands in the program. This means the diagnostic must either be 'on' from the very beginning, resulting in great verbosity, or else 'off' altogether, resulting in nothing at all.

It is also difficult to set 'breakpoints', where you know you will want to stop the program to examine variables. It is just

possible to circumvent this difficulty by using a standard C input statement; for example, scanf, and when the program is running, responding to the request for input with a control-C. This interrupts the execution in the normal way and the variable values can then be printed out, but it is not as satisfactory as a proper breakpoint facility.

Other goodies

Apart from providing a solid interpretative environment, one of the main strengths of RUN/C is the extensive documentation and enormous number of demonstration programs supplied with it. Much of the documentation is an alphabetical reference to each RUN/C command and every C function supported by RUN/C.

Each reference gives a detailed description of how the command/function should be used, and a listing of a sample program to reinforce this. The course code of these programs is also on the disk and can very quickly be LOADED, RUN or EDITed if you so wish. This is an ideal way to learn about some of the more esoteric C features. The main strength of this approach stems from the immediacy of the interpretative environment, but also all credit must go to the implementors for the weight of practical material that they have provided.

Living-C

Living-C, or to be strictly correct, Living-C Personal, is the first of a planned range of C products from a new UK company, Living Software Ltd. Future products will include Living-C Future products will include Living-C Professional, which will reinforce Living Software's perception of two different markets for C interpreters: the professional expert C programmer; and the learner. Clearly, Living-C Personal is aimed more at the learner, but also offers plenty to whet the appetite of an expert awaiting the release of Living-C Professional.

A number of the Living Software personnel were formerly with MicroFocus, the purveyor of CIS-COBOL. CIS-COBOL is renowned as a superb development environment for COBOL, featuring an 'animator' which actually shows the program as it is executing. Living Software has unashamedly adopted some of the CIS-COBOL ideas, including the animator, and exported them into Living-C.

Living-C starkly contrasts with RUN/C. Its manual is a minimal 50 pages. With its CIS-COBOL ancestry, Living-C bears no relation to Basic whatsoever and only one demonstration program is supplied:

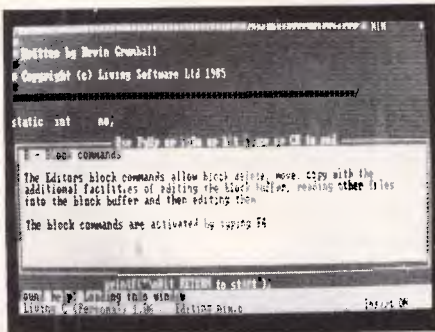
```

-----
Ok
NEW
AUTO
1: /*
2:  print Fahrenheit-Celsius table
3:  for f = 0, 20, ..., 300
4:  (This program is from p. 8 of the Kernighan and Ritchie text)
5: */
6: main()
7: {
8:     int lower, upper, step;
9:     float fahr, celsius;
10:
11:     lower = 0;           /* lower limit of temperature table */
12:     upper = 300;        /* upper limit */
13:     step = 20;          /* step size */
14:
15:     fahr = lower;
16:     while (fahr <= upper) {
17:         celsius = (5.0/9.0) * (fahr-32.0);
18:         printf("%4.0f %6.1f\n", fahr, celsius);
19:         fahr = fahr + step;
20:     }
21: }
22: <esc>
OK

RUN
0          -17.8
20         -6.7
etc

```

Fig 2 Command sequence for entering Kernighan and Ritchie's Fahrenheit to Centigrade program.



Living C's editing commands

a simple matchstick game called Nim. It follows that, even more so than RUN/C, the C newcomer will need a tutorial introduction to accompany Living-C.

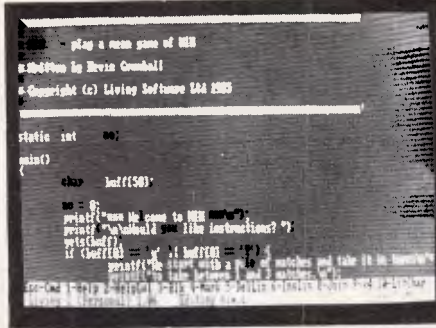
The Living-C software is supplied on a single unprotected disk. Special 'batch' commands are included to copy the programs onto another floppy or hard disk, but it is just as easy to use the standard DOS COPY command. Living-C makes unusually large demands in the DOS filing system, and it is necessary to reconfigure DOS to permit up to 12 files to be simultaneously active, instead of the default maximum of 10. This is very easy to do, and the manual explains exactly how, but it is important to remember to reboot the computer to activate the new configuration. It is also possible to set up Living-C to operate with non-standard display cards, but usually this is not necessary.

When the installation has been completed, Living-C can be activated by typing 'LIVINGC' in response to the DOS prompt. After a short delay, the screen clears to present a mainly blank area over a small menu window and a status line near the bottom. The status line identifies the current file, and most of the menu commands are considered to refer to it alone. Menu selection is based on the usual procedure of pressing the initial letter or moving the cursor to hover over the required option, then pressing 'ENTER'. There is a small amount of onscreen 'help' available for each option.

The menu commands are summarised as follows

★ **Edit** — this enters the editor, to edit the current file.

★ **Compile** — this is a slight surprise, as Living-C is presented as an interpreter. What actually happens is that Living-C needs to generate an intermediate code file before it can run. A very nice feature is that if there are any errors in the compilation then, after flagging the error, Living-C automatically re-enters the editor, at the right point in the source, to allow the user to correct the error. There is also a facility for forcing a compilation through all errors, which can be logged in



Living C's matchstick game, Nim

a file and then read via the editor's help facility.

★ **Run** — this automatically does a compile if necessary. Assuming the compilation is successful, the user is then presented with an interrupt menu — the central control for debugging and running the program.

★ **Compiler control** — this is a facility for specifying the location of '#include'd files referred to in the current C file.

★ **User command line** — from some operating systems, it is possible to run a compiled C program with user-entered parameters that are passed to the main C program, via variables argc and argv. This option allows the Living-C user to set up values for these parameters, before using the Run command.

★ **Set File** — this enables the default current file to be changed.

★ **Interpret program** — the name of this option could more accurately be interchanged with Run. It simply runs the program in the normal way.

★ **Options** — Living-C has fixed space allocation for the program text, data, and so on. This facility enables these allocations to be changed.

★ **Exit** — returns to DOS.

Editing

The Edit option of the main menu allows the current file to be edited, or another file can be edited by specifying an alternative file name when prompted to do so. The editor is a fairly powerful full-screen editor, not dissimilar to WordStar, but lacking some of the more word processor-like facilities. It is clearly more powerful than RUN/C's EDIT, but some users may feel more at home with the simplicity of the latter.

The editor has the usual arrow-key control to move the cursor to the required action point, and the 'page-up', 'page-down' keys can be used to rapidly flick through the code a page (that is, a screenful) at a time.

In addition to the arrow keys, the 10 function keys all have some use during editing. One key gives immediate online help, and others are used for block

operations, line deletion, joining lines together, and so on.

An edit-menu is available by pressing 'escape' at any time, and this offers a number of useful options. Other files can be read into the currently edited file. Global searches, or searches and replace, can be performed, and so on.

The editor is integrated with Living-C's error detection mechanism in order to make error correction particularly easy. After an error is encountered, the editor is restored at the relevant place in the source, and online help can identify the cause of the error and how it might be corrected.

Unlike RUN/C there is no facility to integrate a proprietary editor into Living-C (although Living-C can read source files created by other editors.) This is mainly because the Living-C editor is sufficiently powerful to make such a facility unnecessary.

Debugging

The most distinctive feature of Living-C is the debugging facility, which is a considerable improvement over RUN/C's. The debugging and execution of a program is controlled from an interrupt menu, which is displayed following a successful compilation after Run in the main menu.

The most spectacular option on the interrupt menu is modestly called 'continue'. This splits the screen into two windows — one displaying the source code, and the other available for any input or output from the program. The cursor traces a path over the code as it is being executed, working rather like the CIS-COBOL animator. In tribute to this, Living Software has trademarked the name of this facility as 'Animating C Interpreter'. As print and input functions are executed, the relevant text appears in the output window at the top of the screen, and characters typed at the keyboard appear in the normal way. It is possible to control the speed of animation, and this is the only criticism of the facility: even at its fastest it is rather slow.

Markers can be set by selecting 'Debug' in the interrupt menu. This returns the user to the editor, but with the source code protected so that only markers can be recorded in it. In theory it is possible to set markers from the normal access to the editor, but this did not work in my version of Living-C. One type of marker is, as I have already mentioned, a breakpoint. It is also possible to mark out limited regions of the code to be 'traced' — that is, displayed in animation mode.

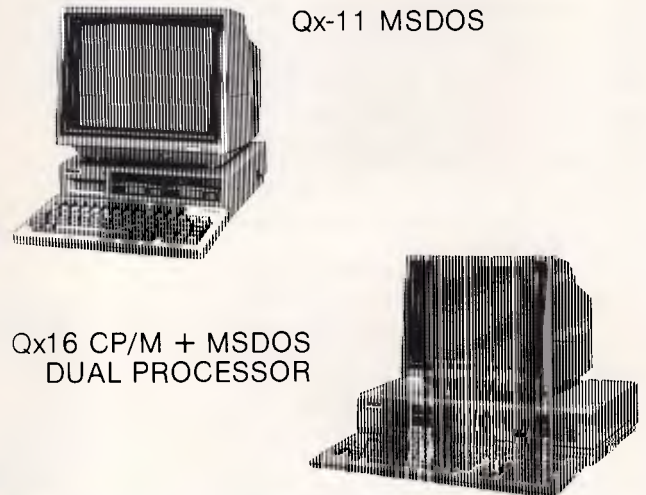
Finally, up to four variables can be

THE EPSON COMPUTER SPECIALISTS

PORTABLE COMPUTERS



DESKTOP COMPUTERS



12 months warranty on all hardware products

PRINTERS

BUSINESS

FX85
FX105
RX100+
LQ1500
SQ2000

TECHNICAL

LX80
JX80 7 Colour
Hi-80 Plotter/Printer
GX-80 — Commodore
— Apple IIc
— Parallel
— IBM Graphics

PERSONAL

P-40 Portable
P-80X Portable

SOFTWARE

INTEGRITY BUSINESS SOFTWARE

- Accounting One
- Ascent
- Horizon

SOFTWARE FROM

- Ashton-Tate
- Microsoft
- Borland
- Digital Research
- Micropro

PpC PROFESSIONAL PERSONAL COMPUTER PTY. LTD.

720 Heidelberg Road, Alphington, Victoria 3078. (03) 49 3123 — 49 3122

C.A.E. ELECTRONICS

P.O. Box 62, Blacktown, NSW 2148

202 Sunnyholt Road, Corner Vardys Road, Blacktown, NSW. (02) 671 6951 — 621 4242

SCREENTEST

marked for continuous monitoring. It is not possible to do this with structures, but only ordinary numeric variables. The values of the variables are continuously displayed in another window at the top of the screen.

Conclusion

Both products will undoubtedly be of great value to anyone wanting to learn C. The immediacy of the interpretative environment, which they both offer, is greatly superior to the traditional C compiler environment. As the products work with standard C, they may also be of use to C experts, who could use them as testbeds for sub-modules in a larger system development.

Living-C, in particular, is a very sophisticated product, offering program animation, a number of other debugging facilities, windowing and a full-screen editor. It is only let down by an indifferent manual, with no C tutorial material at all, and not a great deal of information on the product itself. Fortunately, much of the time the manual is superfluous, and the extensive help screens, particularly if used in conjunction with a pioneering spirit, can usually be used to determine how to use the system.

RUN/C is a much simpler product than Living-C, but paradoxically this fact may greatly appeal to some users. As it closely emulates Basic, it should be particularly easy for Basic users to pick up. The debugging facilities are especially weak, but are still clearly better than those provided by most compilers. Although the manual could not serve as a formal C tutorial, it contains a great deal of helpful information for the C novice.

Both products complement one

another nicely; one's strength is the other's weakness. If you cannot afford to buy both, then a choice could be made on which type of interpretative environment you prefer: a simple Basic style; or a sophisticated windowed, animated, CIS-COBOL style.

Both RUN/C and Living-C sell for \$309 and are available from Fagan Microprocessor Systems, telephone (03) 699 9899. **END**



'I can't help thinking there's something vaguely familiar about this new Sinclair.'

To C or not to C...

The C language used to be intimidating. Then RUN/C came along. It's an interpreter. That means you can run a C program immediately, without compiling it. Perfect for learning C and writing programs interactively. Use it with any standard C compiler for a complete development system.

\$309

RUN/C — The C INTERPRETER™

Master C with our full K&R C interpreter plus full-screen editor.

SAMPLE PROGRAMS

Comes with critically-acclaimed C reference manual and over 100 sample programs on disk.

EASY COMMANDS & FUNCTIONS

Write and execute programs with LOAD, EDIT, and RUN. Debug with TRON, TRACE, and PRON. Use PC BASIC graphic functions like PUT, GET, CIRCLE, and LINE, SCREEN, and DRAW.

\$495

RUN/C PROFESSIONAL™

All the RUN/C advantages, plus powerful features for program development.

LOADABLE LIBRARIES™

Load and run your favorite library functions (C-Food, Multi-Halo, etc.) from within your RUN/C interpreted code.

DEBUGGING TOOLS

Polish program modules before compiling. New source-code debugging facilities allow you to set multiple breakpoints, single-step through a program, view and change variables during execution.

Call FMS about RUN/C interpreters and our catalog of quality programming tools.

RUN/C—The C Interpreter, RUN/C Professional and loadable libraries are trademarks of Age of Reason Co.

Lifeboat and Lifeboat logo are trademarks of Lifeboat Associates

C-Food Smorgasbord is a trademark of Lattice, Inc.

Multi-Halo is a trademark of Media Cybernetics, Inc.

FMS Fagan Microprocessor Systems P/L

95 Canterbury Rd., Middle Park. 3206 (03) 699 9899 AA31604



Optical Mouse

The Apple Macintosh certainly started something with the mouse. It's been implemented on a considerable number of other micros, not the least being the IBM PC and compatibles and the Apple II. Andrew Farrell checks out a recently released mouse for the humble Commodore 64.

As computers become more powerful, software has grown in size and proportion, unimaginable by early designers from times past. Graphics have become an integral part of many computers, and controlling graphics has meant the development of more sophisticated devices such as the mouse controller, introduced on a mass market scale by the Apple Macintosh computer.

There now exist several mouse devices for the Commodore 64, none of which compare to the more powerful standard graphics packages. However, the recently released Datex Optical Mouse comes very close.

The program looks very similar to Macpaint for the Macintosh, and also boasts similar abilities. There is promise of Mouse compatible software in the form of a utility and a wordprocessor in the near future.

The Datex Mouse is lightweight, with a square shape. It connects to joystick port two, requires no other special interfaces and is operated in exactly the same way as most other mice. Beneath this soft exterior is a complex optical decoding circuit which Datex claims to be far more accurate than conventional methods of detecting mouse movement.

I must confess, I did not notice any difference, however I'm sure there is some increase in reliability. The ball which fits snugly into the mouse's underside is not the rubber type some users may be familiar with. Instead, it is a small steel ball which unfortunately tends to slip and skid on very smooth surfaces.

In use

As the software loads, a large mouse appears on the screen and moments

later the work area appears, complete with four pull-down menus, brush types, fill patterns and control icons. Icons represented include: a pencil, spray can, paint roller, eraser, filled box, empty box, circle and text. Below the icons are the brush types, and to the far left of the screen is a selection of some twenty tile patterns with which you may fill areas. Colours for the border, ink and back-

ground may be modified using the function keys.

Using the Mouse's select button, a specific icon may be highlighted, thereby activating it. Brush types and fill patterns are chosen in much the same way. At the top of the screen are: Options, Extras, Line and Text. Each of these, when selected, offers a menu of additional functions. For example, from Options



Can't decide ?



olivetti



NEC APCIII

Now that the NEC APCIII boasts a Software Library Expander (making it compatible with industry standard software) we wouldn't be surprised if you're finding it hard to choose between this machine and the No. 2 seller, the Olivetti/A.T. & T. PC. Just to make it harder, A.T.S. COMPUTING increases the normal 6 month warranty on the Olivetti/A.T. & T. PC. to a full 12 months, matching that on the NEC APCIII. And we'll better any genuine quote from any competitor in Australia on Olivetti, NEC, Brother and Toshiba computer products. Below are just a few examples of the many packages we can tailor to meet your needs — if you only want a computer, let's just say our prices are unpublishable!

NEC APCIII with dual 640K/720K floppies, mono.monitor and keyboard plus free SLE (Software Library Expander) card, memory expansion to 384K, A.T.S. word processing and S.B.A. software (debtors, creditors, general ledger, stock) PLUS Near Letter Quality PRINTER all for the recommended price of the system alone — \$3,565 incl. tax.

OLIVETTI M24 dual 360K floppy system with 640K RAM, mono.monitor and keyboard plus free A.T.S. word processing and S.B.A. software (as above) PLUS N.L.Q. PRINTER all for just \$3,995 including sales tax.

NEC APCIII 20 Megabyte system with free S.L.E. card, memory expansion to 384K and O-P-E-N ACCESS software PLUS the new 24 pin N.E.C. P5 printer (264/94 c.p.s.) all for only \$6,995 incl. tax.

OLIVETTI M24 33 Megabyte system with 640K R.A.M., mono.monitor and keyboard, PLUS S.B.A. accounting software (as above) and ENABLE (integrated word processing, spreadsheet, data base, graphics and communications) and BROTHER M-1509 wide carriage NLQ printer (180/45 c.p.s.) also just \$6,995 incl. tax.

COLOUR MONITORS in lieu of mono. — add \$700.

PRINTERS — Call for prices on NEC, BROTHER, EPSON, T.I.,

MELBOURNE showroom opening soon . . .

TOSHIBA

Phone (02) 858 5999 for details
1039a VICTORIA RD., WEST RYDE 2114 (PARKING AT REAR)

ATS COMPUTING
"Advanced Technology + Service"

CHECKOUT

you may load and save your designs, clear the screen, select the mouse speed and add a title to your picture.

One feature which should have been included is the ability to modify the mouse movement ratio. As the software defaults, the mouse must be moved over an excessively large area relative to the area covered on the screen. On a cluttered desk, there just isn't the space for this sort of waste. I found myself continually lifting the mouse and replacing it at the start of my free desk space in order to move the pointer from one side of the screen to the other. This proved to be very awkward and somewhat clumsy.

Text may be mixed with graphics, however the variety of fonts and styles is very small. Italic or plain text, in either bold or normal sizes may be used. These were somewhat crude, with no option for modification or loading additional sets. Text may be mixed haphazardly with graphics, or by using the Gridon option, may be correctly aligned.

Space designated to the design area is approximately two thirds of the total screen size. This is only a small space by

I found myself continually lifting the mouse and replacing it at the start of my free desk space in order to move the printer from one side of the screen to the other.

comparison to most graphics programs, but most of the drawing options are fully fledged with complete control over brush types, shapes and fill patterns. In this area the Datex software is most impressive.

Brush types provide a variety of means of applying a particular pattern. Brush types of varying thickness may be chosen to provide the appropriate desired effect. By using the spray can, very interesting and effective applications of texture can be achieved.

While the paint and fill routines are exceptionally good, other areas seemed somewhat neglected. I was using an Epson compatible printer with a Cardco G-Wiz centronics interface which was working well with other software, yet I was unable to get the print option to work successfully. Loading and saving images proved difficult at times, especially without the ability to do simple disk housekeeping. It's often necessary to get a directory from the disk, or to for-

mat a new disk. These sorts of options are not normally difficult to include.

Occasionally the mouse was a little disobedient when using the pull down menu, requiring more than the usual persuasion to select an item. Sometimes it insisted on choosing the item above the one I wanted. This fault also occurred

when trying to select the printer function from the Extras menu and instead the Gridon option was selected immediately above my choice.

For detailed work, a slower mouse speed is selected. This provides a very accurate method of drawing, far exceeding the control provided by most other

**THE REVOLUTION
TURNS THE
COMPUTER WORLD
UPSIDE DOWN**

**You've seen the ads,
now read the 'Z' book!**

There's only so much you can say in advertisements, so when a revolutionary Program Writing System like System 'Z' comes along, a book is necessary. And now it is here: the 'Z' book.

It has all the specifications, benefits and definitions — a full profile of the Systems 'Z' that you can read at your leisure.

When you've finished the book, call Zortec for a free demonstration. You'll want to join the 'Z' revolution right away!

BR/ZA 981

**Mail this coupon Today to: 'Z' Book Offer, Zortec Australia Pty Ltd,
1st Floor, 28 Ord Street, West Perth 6005.**



YES! Please send me the FREE 'Z' Book. I understand there is no obligation and no salesman will call.

NAME: _____

ADDRESS: _____

_____/PCode: _____ A.P.C.

**ZORTEC
AUSTRALIA PTY LTD.**

PHONE (09) 481 3277 for the address of your nearest 'Z' Distributor. Australia-wide call 008 999 189

input mediums. Parts of the picture may be moved around using the Frame option. This is very useful when you discover that part of your drawing is in the wrong place and is a simple matter to re-position elsewhere.

Another interesting feature is the line menu. This allows you to control whether a line is to be inverted or overlap when it crosses another area. A selection can also be made between bold or dotted lines and ink or paper drawings. Both the paint and spray options are very fast. When using the paint option, the current tile pattern selected is used to fill the enclosed area. Keep an eye on this before you do any painting, as the wrong pattern in the wrong area is difficult to erase. An 'oops' option would have been invaluable.

Conclusion

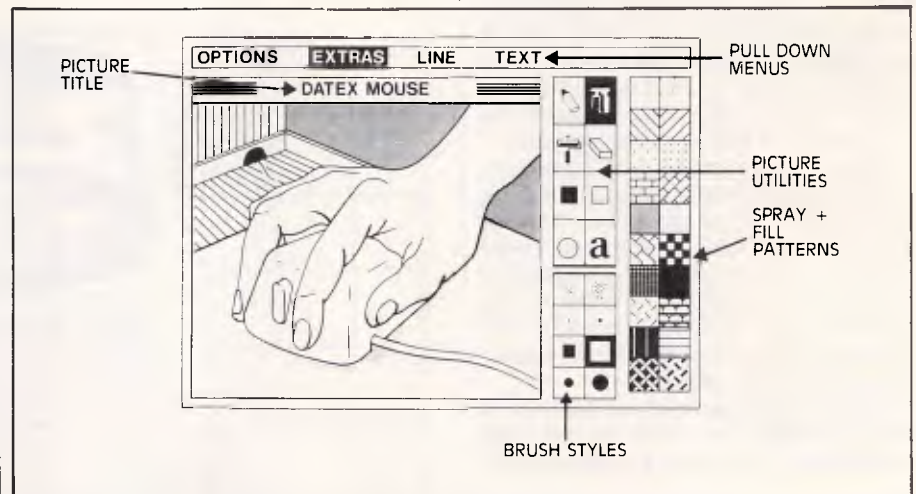
Overall, an impressive combination of software and hardware. Documentation is clear and concise, although it could be a little more comprehensive. The Vatec Optical Mouse is easily the best mouse package currently available for the Commodore 64, although I still see room for improvement. More power in the text



area, and better disk and printer access are essential. A few bells and whistles, such as zoom, mirror and rotate would also be appreciated. A professionally written and presented product nonetheless.

The Datex Optical Mouse is available from the Bit Shop, (02) 799 8525 and costs \$159.95.

END



Schematic showing main components and graphic display of the Optical Mouse.

NO-FUSS COMMUNICATION FOR THE PC

INTRODUCTION

With this EASY TO INSTALL package the user can access almost all TEXT and VIDEOTEX based databases.

for instance, you can:

- Capture messages or files from OTC's MINERVA or TELECOM's AUSPAC at 1200bps direct to disc.
- Download programs from VIATEL using the TELESOFTWARE facility at 1200bps direct to disc.
- Communicate at 300bps with bulletin board services.

COMPUTERS SUPPORTED

A selection of computers supported includes:

TANDY	: Model 1000
NEC	: APC III
T.I.	: PROFESSIONAL
OLIVETTI	: M24/21
SANYO	: 775
PRESIDENT	: 16

The package contains:

MULTI-FUNCTION COMMUNICATION SOFTWARE
DATASAT's V1275 MODEM
PREMIUM AUTO RE-DIAL TELEPHONE.

The V1275 modem is available separately.

DATA SAT MODEMS — *the intelligent connection*
Phone: (02) 525 6688

MASS 11

Over 2200 VAX and 15000 PC installations can't be wrong!

Superior Word Processing Software for VAX, IBM PC & RAINBOW

* PRODUCT FUNCTIONALITY

All the standard word processing functions, plus:

- Integration between VAX, IBM & RAINBOW
- PC-VAX communications & VT100 emulation
- 3 full-function editors, including WPS & EDT
- Table of contents & index generation
- Footnoting
- Scientific equation editing
- On-line spelling corrector
- Calculator
- Column manipulation
- Foreign language support
- Supports most printers, including lasers
- Graphics & CAD integration
- Line drawing
- Journaling & recovery facilities
- Automatic paragraph numbering
- Multiple column formatting
- Multiple headers & footers
- Comprehensive list processing
- Cumulative copy & cut functions
- Sort
- Multiple pitch & font changes
- Split screen editing

and more . . .

* PRODUCT SIMPLICITY * PRODUCT SOPHISTICATION * PRODUCT SUPPORT

For more information on how MASS-11 can meet your word processing needs, contact:

CHOICE COMPUTING Suite 23 "Chatswood Village", 47 Neridah St., Chatswood 2067 Ph: (02) 411 6311

THE BEST

Multitech

***SYSTEM WITH 20** Mb Hard Drive and one 360K Drive. 640K RAM
HERCULES COMPATIBLE 720K Drive Option N/C
GRAPHICS CARD
STANDARD EQUIPMENT
MS.2.11 included **\$4000**

Many combinations available
fine features include:

Cold Reset button on front
6 expansion slots (4 free)
1 x RS232 C Port
2 x Parallel Ports

Software available for business
Wordprocessing, data base etc. etc.
Phone for name and address
of your nearest agent.

MACE REEL PTY. LTD.

Cnr. Sylvan Road and Land Street, Toowong, Qld 4066

TELEPHONE: (07) 870 3600

MULTI-FUNCTION -
MEMORY TO 512K
RS 232 INTERFACE
DMA CONTROLLER
BUS FOR CLOCK-MOUSE

HARD DISK -
10 MEGABYTES
FITS INTERNALLY
SPECIAL LOW POWER

NEW
TANDY 1000 UPGRADES



ASP 03-5000628

MICROCOMPUTERS PO BOX 259
CAULFIELD EAST 3145

Segmented architecture

Bill Unsworth provides a definition of segmented architecture for the non-technical user, and considers its implications as larger memory becomes the 'norm'.

You will know from your microcomputer history books that the first micro-processor successfully used as the basis of a microcomputer was the Intel 8080. It was quickly superseded by the Zilog Z80 which could run 8080 software but was easier to design into products. Popular in parallel with the Z80 was the MOS 6502.

Nowadays only the low end micros use these processors, such as the Spectrum with the Z80 and the VIC/64 with the 6502. Machines since then have used either the Intel 8088 and similar

processors (since 1981) or the Motorola 68000 (since 1984).

Memory addressing

Microprocessors basically work in the following way: they read an instruction from memory and store it inside themselves (in a 'register'). If the instruction requires more data, they also read that from memory and put that into data or general purpose registers. The instruction is then carried out. Unless the instruction itself just carried out specifies otherwise, the next instruction in memory is read in and the process is repeated. This description makes an assumption about the way memory works. We treat the memory as a linear stream of 'pigeon-holes', which can store instruction or data indiscriminately. We access any particular pigeon-hole by knowing its 'address'.

In general certain things are put into certain places in memory and this leads to the concept of a 'memory map'. Thinking again of memory as a sequential series of addresses, the designer will have pre-allocated certain addresses to hold certain things — Fig 2 shows an idealised memory map for a typical 8-bit micro. All the 8-bit micros mentioned above have 16 address bits. The 'pigeon-holes' that can exist as far as the processor is concerned go from address 0 to address 65,535. The latter number is of course 2¹⁷⁻¹ or 1111111111111111 in binary. The processor can toggle up and down 16 lines to form unique addresses from 0-65,535 or 64k. You will also see the addresses on memory maps

expressed as hexadecimal numbers (to the base 16 rather than decimal to the base 10). To avoid confusion they are usually prefixed with a '\$' sign.

In Fig 2 part of the memory is used by ROM — that is, permanent memory not erased at power off. This will include the bootstrap (software to start the computer up, possibly including loading the DOS) and, particularly on the home micros, a Basic interpreter; then there is space for the DOS. Finally, there is space for the spreadsheet, database program or flight simulator. Usually there is a little

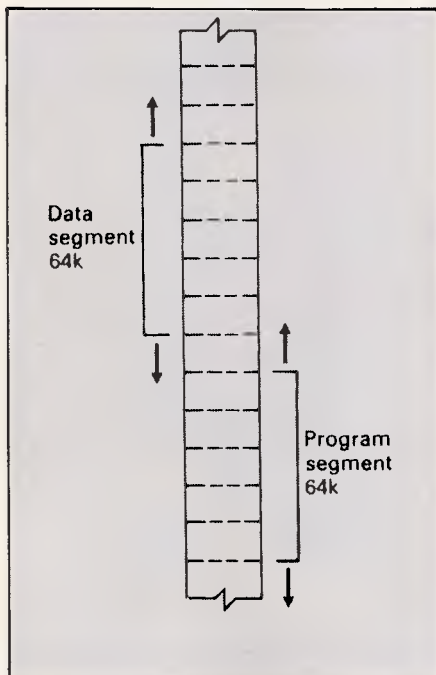


Fig 1 Microprocessor

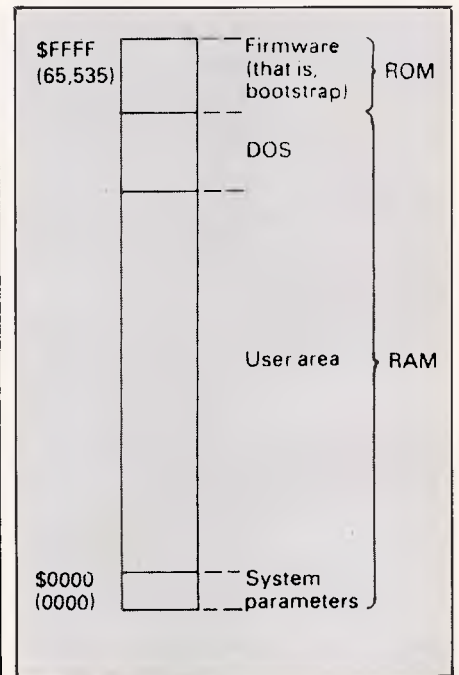


Fig 2 Memory map for an 8-bit micro

bit of space at the bottom reserved for use for the microprocessor's own information. When you switch on, how does the microprocessor know where to start? This is usually done by the processor automatically loading from a fixed address in ROM the addresses of the first instructions it should execute.

Segmentation

Now let us look at what 'segmented' means. We know that the 0-64k address space is a fundamental limitation of the 8-bit processors. The processor has to be fooled by special electronics external to the processor if more memory is to be used. However, the limitation does go a bit deeper because other things also conform to this limit including, for example, the size of the registers inside the processor (sometimes 16-bit) and the way the machine code instructions work.

The logical way to address more memory is to increase the number bits and still have a linear sequence of addresses. However, this also involves a corresponding internal instruction set. But once such a design decision has been made you have completely cut yourself off from any previous software on an earlier processor: all the software — DOS's, languages, applications software — will need to be reworked.

Motorola with its 68000 family of processors decided *not* to attempt to keep compatibility with its 8-bit processor the 6800 (nor with its later 6809). Hence it could redesign as it wished.

Intel, however, decided that compatibility with its 8080 was of crucial importance and had to be maintained. The company did this by taking a larger memory map and *segmenting* it. On the 8088, 8086 and more recent 80286 (used in the IBM PC/AT) the memory is treated as 64k chunks. Rather than a single address, the address is combined from a segment base address and an offset address. The offset address is 0-64k and corresponds to the previous 8080 addressing range and so maintains compatibility.

The best way to think of the segmenting is to imagine the segment as a window onto the larger memory map. This window can be moved around and so access more than 64k, but in 64k chunks: in fact, the arrangement is rather more complicated than this with a number of pairs of segment register and offset register. Fig 3 illustrates this with the simplest arrangement of data segment and program segment, so we have a number of these windows that we can move around. Thus Intel maintained compatibility and provided a way to address more memory with minor program changes.

Problems

When IBM brought out the PC, its minimum model was 16k and on the main board you could expand it to 64k. The current models have either 64 or 128k and can be expanded on board to 256k. Further expansion is possible with plug-in boards. It can be seen that initial

'The best way to think of the segmenting is to imagine the segments as a window onto the larger memory map. This window can be moved around and so access more than 64k...'

software was written for 64k, then programmers found that extending it to 128k was easy. But the segmentation means that you cannot just let your program grow and just plug in more memory.

Memory seems set to keep on falling in price. The 256k chips are pretty well the 'norm' now and their cost per bit compares well with the older 64k chips. But 1Mbyte chips are just being sampled, and I would guess that most designs now being worked on would be able to use either 256k or 1Mbyte chips.

Will users want more memory? Again, the answer on past form must be an unqualified 'yes'.

Larger operating systems such as

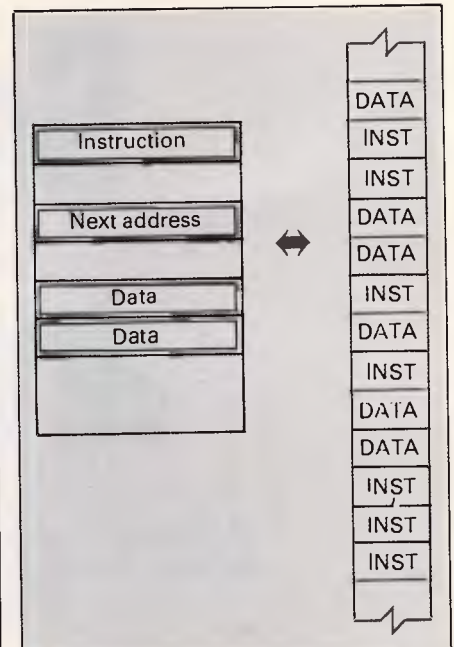


Fig 3 Segmented addressing

Concurrent DOS, Topview and Unix look set to become popular and, if multi-tasking and multi-user systems become accepted, they will require much more than 64k (that is, they will require at least 1 Mbyte RAM).

So how do you usefully use 1 Mbyte RAM on an 8088-based segmented architecture processor? The answer is to hold, somewhere in memory (in a fixed location), an index which says which sections of program or code are where. Depending on the type of program you could just preallocate specific data to specific locations. However, this gives



COMPUTER HEAVEN

The biggest range of software and accessories in Australia! We deal with all the usual warehouses and also directly import several hundred lines unique to us. Let Chambers skilled staff show how your computer can be a powerful business machine.

ATARI 520-ST

NOW IN STOCK!

120 VOLT MODELS — 240V POWER SUPPLY NEEDED
COLOR MODELS HAVE \$699 FREE SOFTWARE

- w/-512K RAM, disk drive mono monitor, mouse\$1995
- w/-512K RAM, disk drive color monitor, mouse\$2500
- 1M RAM disk drive mono monitor, mouse\$2500
- 1M RAM disk drive color monitor, mouse\$2995

25% DISCOUNT

on all Atari and Amiga software for 30 days to all purchasers of the computer. Offer may be withdrawn at any time.

- GSTC COMPILER.....\$199
- Easy to learn and use. Super fast compile times and access to the GEM and TOS functions. Use it to create sophisticated GEM software. Full GEM support is provided in the run-time libraries, both explicitly and implicitly. By default, all programs written by GSTC using standard C input/output will automatically use GEM windows without any explicit GEM calls being made. Provides 100% GEM library routine support.
- GST-ASM MACRO ASSEMBLER.....\$139
- Full Motorola compatible 68000 macro assembler with advanced features and extremely fast throughput.
- GEM PAINT (Graphic Design).....\$125
- GEM WRITE (Word Processor).....\$250
- PRINT SPOOL.....\$79
- RAM DISK.....\$175
- DEGAS (Graphics Package).....\$99
- FINAL WORD (Word Processor).....\$299
- PROFESSIONAL (Spreadsheet).....\$150
- ST BUSINESS TOOLS (Utility).....\$150
- GATO (Strategy).....\$85
- ST COBOL (Productivity).....\$125
- TOOL BOX.....\$175
- FORTH.....\$175
- STAR RAIDERS (Arcade Game).....\$75
- 2 KEY ACCOUNTING (Finance).....\$199
- VIP PROFESSIONAL (Multi-purpose).....\$250
- FARANHEIT 451.....\$75
- TRANSYLVANIA.....\$99
- PERRY MASON.....\$99
- MONDAY MORNING MANAGER (Sports).....\$125
- HABA WRITER (Word Processor).....\$99
- EXPRESS (Word Processor).....\$99
- M-DISK.....\$105
- SOFT SPOOL.....\$105
- HIPPO COMPILER.....\$105
- HACKER.....\$105
- ATARI PROFESSIONAL (Spreadsheet).....\$250
- MIND SHADOWS.....\$105
- ZOOMRACKS (Information Manager).....\$175
- FINANCIAL TIME MACHINE (Simulation).....\$175
- DEJA VU (Adventure).....\$135
- HALLEY PROJECT (Simulation).....\$165
- KEYBOARD CADET (Typing Tutor).....\$95
- KING'S QUEST II (Strategy).....\$125
- ULTIMA II (Adventure).....\$125
- HOME PLANETARIUM (Education 14 & up).....\$125
- MISSILE COMMAND (Arcade Game).....\$75
- ASTEROIDS (Arcade Game).....\$75
- BATTLEZONE (Arcade Game).....\$75
- CALCULATOR/CLOCK/BREAKOUT (Multi-purpose).....\$75
- CENTREPEDE (Arcade Game).....\$49
- D B MASTER (Data Management).....\$250
- A MIND FOREVER VOYAGING.....\$105
- CUT THROATS.....\$95
- DEADLINE.....\$125
- ENCHANTER.....\$95
- HITCHHIKERS GUIDE TO GALAXY.....\$95
- INFIDE.....\$105
- PLANETFALL.....\$105
- SEA STALKER.....\$95
- SORCERER.....\$105
- STARCRASS.....\$125
- SUSPECT.....\$105
- SUSPENDED.....\$95
- WISHBRINGER.....\$95
- WITNESS.....\$95

128 PROGRAMS IN STOCK

- TURBO-ROM 128.....\$45
- CONSULTANT (Data Management).....\$189
- WORD PRO 128.....\$169
- PAPERCLIP (Word Processor).....\$199
- DATA MANAGER 128 w/ Report Writer.....\$139
- SWIFT/CALC SIDEWAYS.....\$139
- WORDWRITER.....\$139
- GATO.....\$95
- KING'S QUEST II.....\$119
- MICKEY'S 3 IN 1.....\$119
- Compose, engineer, explore music without the need to know programming or music. Prints out sheet music.
- FINANCIAL TIME MACHINE.....\$189
- HALLEY PROJECT.....\$119
- SIDEWAYS.....\$59

FREIGHT, PACKING, ETC., IS \$3 PER ORDER, IRRESPECTIVE OF WEIGHT, VALUE, SIZE OR DESTINATION.

SOFTWARE will be exchanged for the same title if faulty. Some of the newer programs may self-destruct if any attempt is made to copy them and NO exchange will be made in those circumstances.

**VISA • MASTERCARD
BANKCARD WELCOME**

We stock a dozen different printers, 20 or so word processors, about the same number of databases and spreadsheets, 17 accounting programs and hundreds of accessories most other stores don't even know exist but have room here to list only a few. Phone us on (03) 663 4441 for anything in which you are interested. If it isn't in stock, we can get it very promptly.

AMIGA

OUR 5TH SHIPMENT IS HERE NOW!

BUY YOUR AMIGA FROM US OR DIRECT FROM OUR USA STORE

We can supply the Amiga and all available accessories promptly from our local stock or you may buy it at US prices by sending payment to CHAMBERS COMPUTER SUPPLIES in California and arranging your own shipping, customs clearance, duty and sales tax payment. Direct shipments do NOT get free service in Australia and do NOT qualify for the 25% software discount. Full details on request.

SERVICED AUSTRALIA-WIDE BY FERNSPRECHER TELEPHONE SUPPLY

C64/128 All the items listed in our earlier advertisements are still available PLUS these exciting new products. Phone (03) 663 4441 or (02) 356 3155 for further information.

3 YEAR WARRANTY

is available on all equipment sold by Chambers. Ask for details.

- #### EDUCATIONAL
- MATHS, O LEVEL.....\$19
 - PHYSICS, O LEVEL.....\$19
 - GERMAN MASTER, A, O LEVELS.....\$19
 - FRENCH MISTRESS, A, O LEVELS.....\$19
 - COMPUTER STUDIES.....\$19
 - DR WATSON ASSEMBLY LANGUAGE TUTOR.....\$85
 - STARTER KIT for programmers.....\$125
 - 10 Great programs, including word processor, mailing list, basic programming primer, 6502 intro, sound and sprites.....\$29
 - TRAINING KIT Disk/Worksheet.....\$29
 - How to get the most from your keyboard, how to use your disk drive effectively, how to write your first BASIC program.....\$25
 - 32 PROGRAMS.....\$25
 - The book alone retails for \$29.95. 32 useful programs already on disk to save you the chore of punching them in. Book also gives you exercises in how to change them. A vital follow on to the above or to Commodore's Introduction to Basic.....\$69
 - ALL THREE OF THE ABOVE.....\$69
 - COMMODORE'S INTRO TO BASIC.....\$29
 - HAN-ZON SERIES:
 - Beet The Bomb, Keyboard Skills, Super Drag.....\$19
 - Spelling, Treasures.....\$25
 - Tell Tales.....\$39
 - EDUCATIONAL TAPES.....\$85
 - or all 18 for \$200. Written by Australian teachers conforming to Victorian curriculum. Young Maths, Multiplication, Add & Subtract (2 Tapes), Division, Multiplication, Shipmates, Race To The Moon, Inverbridge, Sveve Maths, Supermind, Spelstair (4 Tapes), Rocket Spell, Anagram Fun and Word File Maker.....\$85

HARDWARE

- VOICE MASTER Covox.....\$75
- Speech synthesizer that uses your own voice. Your 64 can sing, grunt, make animal noises or talk in any language you like. Included are programs for talking calculator and talking alarm clock.
- SUPER VOICE MASTER.....\$149
- Now your 64 or 128 will do what you tell it! All of the above PLUS Word Recognition (your 64 responds to your spoken commands) and Voice Harp.....\$149
- QUILRAH SPEECH 64, two tones.....\$69
- 1541 COOLING FAN.....\$45
- NUMERIC KEYPAD 64/VIC-20.....\$99
- EXECUTIVE II DE-LUXE Printer.....\$395
- All the features of the famous Gemini PLUS B languages and proportional spacing. It's 395 words per minute (7% slower than the Gemini which now sells for \$330 more). Prints Commodore, Apple, IBM and lots more graphics.....\$475
- RITEMAN SUPER C PRINTERS.....\$475
- 125 cps dot matrix. Prints without bending the paper so even thin card can be used. Full graphics, Commodore interface included. Complete with stand to allow paper to be stacked.
- DOT MATRIX PRINTER LISTER.....\$199
- SMITH CORONA delay wheel printer.....\$495
- Printer INTERFACES: 12 different from.....\$49
- 18K PRINTER/BUFFER for Centronics.....\$59
- Uses the hidden memory of your 64 or C128. Includes program to interface from the User Port.
- PRINTINTERVIEW + G graphics I/face.....\$99
- RS232 DE LUXE I/face.....\$99
- C64 MOTHERBOARD (w/ reset, 3-way).....\$85
- 2-IN-ONE MONITOR CABLE for 128.....\$59
- CASSETTE INTERFACE and DUPLICATOR.....\$79
- PAGE/MATH Text holder.....\$39
- DISKETTE SAFE, lockable 100 capacity.....\$29
- COMPUTER MAINTENANCE KIT.....\$29
- FERNSPRECHER Auto Modern.....\$199
- Auto-rewind, Vialdi, COIT and Bel. Complete with software for 64 (RS232 I/face needed for other computers). Telecom Approved. This and the 1.1 meg drive is the basis for a BBS.
- TELEDATA (Handio).....\$199
- TEMPERATURE PROBE.....\$45
- MOUSE FOR 64/128.....\$149
- Complete with graphics software. Printer options.
- LIGHT INTENSITY PROBE.....\$39
- COMPUTASWITCH.....\$199
- 8-CHANNEL MULTIFLEXER.....\$29
- FOOTSWITCH CONTROL.....\$29
- 8-WAY I/UP ADAPTOR.....\$39
- VIC-REL Cartridge.....\$75
- COMPUCOVER Plastic, hinged.....\$29
- MAINTENANCE KIT.....\$29
- HEAD ALIGNMENT TAPE.....\$25

SPECIAL INTERESTS

- 664-NAME GENEALOGICAL PROGRAM.....\$85
- Produces A, 5, or 6 generation family record charts to the printer. 4-generation charts to the screen. Fully indexed and with easy screen editing, 864 names, plus notes on each person. Fit on each disk and several disks may be used.
- FAMILY HISTORY III for IBM comp.....\$350
- PROLOG PROLOG.....\$135
- Produces 4 or 5 generation pedigree charts, ownership, mating, breeding, shows and award records with full indexing and easy screen editing. Search function allows easy access (IBM and Apple versions available soon).
- TATTS 45 PROGRAM Just Issued.....\$85
- ASTROLOGY PROGRAM.....\$85
- (Also for Apple II+ and IBM PC). Based on program used world-wide by professional astrologers. Provides individual horoscopes for all times and places. Much deeper than the pop-style astrology you see in magazines. Basically geocentric but heliocentric is possible. Koch system of Houses and Tropical Zodiac but Western Sidereal is an option. Student guide lets you ask the computer questions like: What does a Gemini rising sign mean?

UTILITIES

- NEWSROOM.....\$89
- PRINT SHOP.....\$85
- P/S GRAPHICS 1 2 3.....\$845
- DESIGNER'S PENCIL.....\$49
- PAINT BRUSH.....\$49
- KWIKDRAW.....\$49
- MIND PROBER.....\$59
- MIND OVER MINORS.....\$59
- MIND OVER MINORS.....\$59
- SWY TRAVE.....\$89
- CROSSWORD MAGIC.....\$89
- PRINTER GRAPHICS UTILITY.....\$125
- MUSIC STUDIO.....\$59
- 64 DOCTOR.....\$49
- 1541 PHYSICAL EXAM.....\$85
- 1541 DISK ALIGNMENT KIT.....\$59
- 2 Books, 2 Disks (Program Plus Sign Alignment) and Track Sign Detector allows you to do all routine maintenance on your 1541. Much more comprehensive than the GSM Kit.
- C64-C128 LIGHT PENS.....\$49
- Complete with Software to draw, play games, fill in 16 colours and Save and Load.....\$89
- LOODLE!.....\$89
- CAD-PAK.....\$89
- FLOWCHARTER.....\$89
- THE FINAL CARTRIDGE.....\$159
- Includes Centronics I/face, 24K extra RAM, Basic 4.0 commands, Toolkit.....\$89
- MICRO-PROLOG 64 A1.....\$275
- Directly addresses screen graphics. Includes a prolog editor. New for the 64, this key analytical language has proved its worth in broadening the application of logical analysis.....\$89
- CODE-PRO 64.....\$119
- OXFORD PASCAL (new edition).....\$119
- ASSEMBLY LANGUAGE (Honyfid).....\$225
- BASIC PROGRAMMING.....\$25
- FORTH 64 Commodore.....\$89
- FORTH (Absacus).....\$89
- C POWER (532 page manual D).....\$199
- Z-80 CARTRIDGE.....\$45
- ZOOM!.....\$49
- CRASHMON.....\$89
- BLITZI Compiler.....\$99
- PETASAL.....\$19
- COMMAL 14 Tutorial.....\$19
- MAE 64.....\$175
- SWIT & PACE.....\$175
- Includes ASCII/Text Editor that features a word processor, screen package, IEEE driver sub-routines in machine language and a powerful machine language monitor.....\$599
- MACHINE LIGHTNING.....\$599
- FLIGHT SIMULATOR.....\$59
- MERCENARY.....\$39
- ALTERNATE REALITY.....\$439
- SOLO FLIGHT with speech synthesis.....\$39

ACCOUNTING

- ACCOUNTING PACKAGE.....\$159
- TOTL's newest lightning fast machine language version includes stock control and printing of invoices and statements, concurrently updating your inventory. Choice of 4 prices for each item plus flags when re-order level is reached. Dates, pesticides, etc., selectable for Australia or US. All programs lend from a master menu. Balance forward system. Invoices allow both taxable and non-taxable items and screen prompts and printed output headings can be customized to fit any business. This and the Quasar or Tahaho disk drive make your 64 the most powerful business machine available. All the new enhanced TOTL programs are exclusive to Chambers, now the ONLY authorised TOTL dealer in Australia.
- 64 TOTL GENERAL LEDGER.....\$99
- Does the whole of your final accounts. If you're using the TOTL package it automatically draws data from there.
- 64 ACCOUNTING by Software Design.....\$139
- Sept. '85 version. Products at any time detailed or summary trial balances, profit and loss and balance sheets and prints reports, invoices and statements on plain or pre-printed paper. Profit centres give separate financial reports for each department and can combine into a single report. Up to 10 bank accounts may be used concurrently and each transaction plus 700 journal entries.....\$45
- dialog STOCK AID.....\$45
- Easy to use but effective stock control program with full reporting facilities to both screen and printer. Numerous features include sorting by any field, amend re-order levels, unit prices, recall entries, browse, find, compare and print dialog TRANSACT.....\$45
- Comprehensive double entry bookkeeping system with self-checking routine and full reporting facilities. Although easy to use, some accounting knowledge is necessary to get full advantage of the program.....\$45
- dialog INVOSTAT.....\$45
- Invoice, Credit Note and Statement generator that runs in memory. Calculations for discounts, nettt, tax and totals are performed automatically. User-defined templates can be printed on invoices.
- SOUTH PAC GENERAL LEDGER.....\$599
- CHARTIST PROGRAM TAS-64.....\$149
- Enhanced version just released. Chart shares with this sophisticated system for the serious investor. Pinpoint trends and patterns by analysing the history of stocks and shares. Prints charts in two sizes.

DISK DRIVES

- 1571 COMMODORE DRIVE.....NOW IN STOCK
- MSD DUAL DISK DRIVE.....\$1250
- 240 Volt, US made. All metal, with one parallel and two serial ports and 85110 microprocessor with 16K ROM and 6K RAM. Serial interface cable included, but also has parallel port. VIC-20, 64 and 128 read/write compatible and also read compatible with the big Commodore business machines. Formats disks in seconds and duplicates in a minute or so.
- COMMODORE 1 MEG DRIVE.....\$399
- TAH-AHO Commodore/Apple DRIVES.....\$395
- Top quality all-metal drives that will run BOTH Apple and Commodore disks. Complete with all plugs and 20-line parallel cables to connect to all plugs to your 64 or C128. Switches to let you choose Device No. 8 or 9 and Normal, Write Protect or Override Write Protect. Single drive expandable to double with additional drive. Regulated 240 volt 50Hz power supply. Service Australia wide by Hills.
- QUICKSILVER/FLASH/IEEE INTERFACE.....\$299
- Will built-in IEEE cable! Loads 64 programs up to 60K in 1/2 second. Write Protect or Override Write Protect. Single drive expandable to double with additional drive. Regulated 240 volt 50Hz power supply. Service Australia wide by Hills.
- 90K and MSD.....\$250
- IEEE INTERFACE.....\$250
- PET + IEEE Cable.....\$89
- FLASH with ON/OFF switch.....\$175
- FLASH SX64 version.....\$175
- FLASH for 128.....\$199

SPREADSHEETS/DATABASE

- TOTL INFOMASTER Database.....\$59
- RUN magazine "best of all". Dynamic record and field definitions. 10 files per diskette, records up to 2400 characters long, fields up to 245 characters, up to 100 fields per record with repeating fields. You can define your own report format with sorted and selected records.....\$59
- INFOFITCALC w/- SIDEWAYS.....\$139
- MULTIPLAN.....\$139
- COMMODORE'S CALC RESULT.....\$89
- CALC RESULT ADVANCED.....\$148
- PRACTICAL.....\$49
- PRACTICE.....\$45
- INSTANT RECALL.....\$65
- COMMODORE DIARY.....\$49
- ELECTRONIC HOME SERIES.....\$24
- Budget, Diary, Expense Manager, Bank Manager, Bill Payer. Low cost but very versatile. Each has at least 15 categories and all produce printouts using the full facilities of your printer/interface combination. Screen displays include color graphics.....\$125
- PRACTICAL.....\$149

WORD PROCESSORS

- TOLWRITER dBase + w/p + checker.....\$99
- Included word processor plus database with 10 user defined fields plus expandable spelling checker. Live screen editing, auto word wrap, global search or search and replace, set tabs like a typewriter and many other features. HELP menu make it easy to use even though it's the most powerful 64/C128 word processor.....\$89
- VIZAWRITE.....\$89
- WIT & PACE.....\$89
- WORDCRAFT.....\$89
- MIRAGE PROFESSIONAL W/P.....\$99
- TEXT-PRO/DATA-PRO.....\$49
- CODEWRITER Ready-To-Run.....\$849
- Small Business Inventory, Retail Invoices, Salesmen's Expenses, Accounts Payable, Accounts Receivable, Album Library, Appointment Planner, Balusters, Coin Collector, School Reports.....\$99
- WORD PRO 64.....\$99

TO ORDER, SIMPLY PHONE (03) 663 4441

CHAMBERS COMPUTER SUPPLIES
2nd Fl, Curtin House, 252 Swanston Street, MELBOURNE 3001 (03) 663 4441
1st Fl, Crest Hotel, 111 Darlinghurst Rd, KINGS CROSS 2011 (02) 356 3155

Save on our low, low prices!

Unbeatable offer

OLIVETTI M24

HARDWARE SPECIALS

M24 256K RAM 2 x 360K
Floppies MS DOS/GW
basic green/amber
monitor

\$3650

M24 hard disk 10 meg.
640K RAM MS DOS/GW
basic green/amber
monitor

\$4900

Olivetti M21 portable MS DOS/GW
basic 256K RAM twin 360K floppies
9" high resolution amber screen

\$3550

OTHER OPTIONS

MS DOS/GW BASIC		\$100.00
640K EXPANSION	add	\$250.00
20 MEG HARD DRIVE	add	\$480.00
CHOICE AMBER/GREEN SCREEN		\$NIL
CHOICE OLIVETTI OR IBM KEYBOARD		\$NIL
COLOUR MONITOR	add	\$630.00
40 MEG HARD DRIVE		\$CALL
720K FLOPPY DRIVE	add	\$388.00
8087 CO-PROCESSOR	add	\$490.00

ENABLE

ENABLE — the very best integrated System
includes Word Processing, Spreadsheet, Data
Base, Graphics, Communications.
Normally \$1,100.00

LATEST VERSION — SPECIAL **\$899**
**INSTALLED FREE ON ALL HARD DISK
SYSTEMS**

** ALL PRICES INCLUDING SALES TAX **
** DELIVERY ANYWHERE IN AUSTRALIA **
** CASH BANKCARD OR TERMS **



* OLIVETTI M.24 SPECIFICATIONS

- * 256K RAM
- * 360K FLOPPY
- * 7 SLOT EXPANSION BOARD
- * 8086 8 MHZ PROCESSOR
- * 12" HIGH RESOLUTION 640 X 400
SCREEN — STANDARD
- * SERIAL AND PARALLEL PORTS
- * BATTERY BACKED CALENDAR/CLOCK
- * DRIVES CONTROLLERS AND RAM AS
PER OLIVETTI SPECIFICATIONS

(ALL FULLY WARRANTED BY OLIVETTI)

DATA STORAGE SYSTEMS

FEATURES

- Designed for internal mounting to IBM-PC, XT.
- Reliable TEAC SD-510 drive (10MB) or SD-520 drive
(20MB) and compatibles.
- Controller board supports up to 2 drives.
- Standard half-height drive is used for low power
consumption.

10MB \$1500

20MB \$1800

Edcom computer

PHONE (07) 44 9501
37 BUCHANAN STREET
through to RIVER DRIVE
P.O. BOX 20,
SOUTH BRISBANE 4101.
TELEX No. 44983

PROGRAMMING

reasonable efficient programming as segment change is only needed whenever the type of manipulation change.

The writer of a compiler or interpreter has a more difficult problem, however — his job is to allow the programmer to write software using labels, (that is, names such as 'Address' and 'Stock No') to refer to items of data rather than needing to know the segment and address of each item. The larger the amount of memory installed and the more complex the program, the greater the problem caused by the segmented architecture. The user will see this as a small program running fast, but larger and larger programs running slower and slower: if you double the amount of data in your spreadsheet you will find it taking more than twice as long (assuming it was efficiently coded in the first place).

Conclusion

Let's summarise then what segmented architecture means to the user as he needs to use more and more memory:

(a) If he has an application program that can manipulate larger amounts of data (that is, significantly more than 64k), it will run slower than an equivalent program on a non-sequented architecture

program. This has implications for Benchmarks. Thus a small Benchmark may run at the same speed as two different micros but if the Benchmark uses a lot more data, the Intel-based system will be much slower. A factor of five slow-down was recently quoted in *Byte* (see reference).

(b) Most languages running on the IBM PC are limited to 64k for data and 64k for

'... But in 64 chunks: in fact the arrangement is rather more complicated than this with a number of pairs of segment register and offset register.'

programs: for example, this applies to the Digital Research languages CBasic and Pascal MT+ running under CP/M-86 (8086,8088) and CP/M-68k (68000). If you must write larger programs or use more data, then you are forced to write assembler routines to handle segment indexing and addressing or even write the whole program in Assembler.

(c) No languages are available for the Intel-based micros that can handle arrays with more than 64k elements (see reference). This severely restricts the use of the PC for scientific, technical and statistical processing jobs, even though, with the add-on 8087 numeric processor, the PC and clones are pretty nifty for smaller jobs.

The reference from *Byte* is interesting in that the authors realised the problems only after they had bought a PC and proceeded to design their own Nat Semi 32032-based, add-on processor board! Not the best or most inexpensive way of solving the problem but a tribute to the IBM PC open architecture.

The IBM PC and clones did present a significant step forward when introduced in 1981. The architecture allowed the transfer of previous software; the 16-bit and faster processors gave higher performance than the 8-bit products. Memories of 128k and slightly higher were very useful and retained the performance advantage. However, as we move to 1Mbyte and more as the norm, the PC, PC/AT and clones suffer from severe problems on performance and the ability to use efficiently the memory available.

Reference: T G Marshall, *Byte*, vol 10 No 9, September 1985.

END

"PC-SPEED"

Double your IBM PC's processing speed for under \$500.00

The innovative expansion board that doubles the processing speed of your personal computer. Just plug the **PC-SPEED** into your system and watch **ALL** your PC programs (Lotus 1-2-3, dBASE III, Wordstar, and more) run faster and more efficiently than ever before... without special commands or interface software.

But best of all, you can pick up "**PC-SPEED**" without running up a huge bill. At less than \$500, "**PC-SPEED**" is less than half the price of other accelerator (turbo) cards and turns your PC into a machine that's virtually as fast as the new PC AT.

"PC-SPEED" TECHNICAL SPECIFICATIONS

- ° Increases IBM PC processing speed by over 200%
- * Features 4KB high-speed cache memory
- * Includes an ultra-fast 10MHz 8086 microprocessor
- * Works with any 8088-based IBM PC-compatible operating system
- * Transparent to existing software, including Lotus 1-2-3, Wordstar, dBASE III, etc.+
- * Simple plug-in installation into one expansion slot
- * Has no effect on existing system memory
- * Low cost method of achieving PC AT processing speed

+NOTE: some limited code-dependent timing programs run at original speeds.



commercial and professional microsystems
9th Floor, 505 St. Kilda Road, Melbourne, 3004, Aust. Tel: (03) 267 7829
Branch Office: 18 Park Road, Warburton, Vic. 3799. Tel: (059) 66 2037

REDUCE YOUR TYPESETTING COSTS! AND SAVE TIME.

Bring (or post) your Macintosh disks to Desktop Publishing Company.

We will Laserprint your files on high quality art paper, using our Apple LaserWriter. ®

Output is suitable for immediate offset printing or photocopying at a fraction of the conventional costs.

NEED *PageMaker*?

Buy from the people who use it everyday!

phone: 62 2532
5th floor, 520 Collins Street,
Melbourne, Vic. Aust. 3000



Desktop Publishing

C O M P A N Y P T Y . L T D .

The *BIG* compatibles

SUPER XT

"... the perfect IBM clone ... the most compatible."

Western Mail 7th Dec.

256K RAM, BIOS/diagnostic ROM, 360K Teac drive,
10MB Seagate hard disk, 2xRS 232C card, Parallel port,
Sound circuitry, Socketed IC's.

Includes wide range of business software

\$1,300 ex. (\$1,550 inc.)

640K RAM multi function card version

\$1,650 ex. (\$1,840 inc.)

PC AT

Completely IBM PC AT compatible

80286 CPU, 512K RAM, 1.2MB IBM type floppy, 20MB hard disk,
Serial and Parallel ports, Battery backed clock and calendar.

Includes PC DOS 3.10, wide range of business software

\$5,250 ex. (\$6,300 inc.)

Peripherals available at ridiculous prices,
wholesale to computer purchasers

VZ-200/300

C-16, Plus/4

Amstrad owners

Write for free software catalogue, newsletter and marketing terms,
stating which computer you own.

LYSCO

P.O. Box 265
Bunbury, W.A. 6230

THE FABULOUS CASSETTE

50

50 GAMES ON ONE CASSETTE

BBC A/B Spectrum ATARI VIC-20

ONLY
\$29.95

NOW AVAILABLE FOR
 commodore

It is impossible to tell you everything about the 50 games on CASSETTE 50 but they include many types such as maze, arcade, missile, tactical and logic games, to suit most tastes in computer game playing. CASSETTE 50 will appeal to people of all ages and the games will provide many hours of entertainment for all the family at a fraction of the cost of other computer games.

**EXPRESS DELIVERY-
ORDER NOW**

Name _____

Address _____

Post Code _____

COMPUTER: _____

please send me _____ 50 game tape at **29.95**

TOTAL CHEQUE PAYABLE TO
SOFTPAC ENTERPRISES
P.O. BOX 285 GLENROY VIC. 3046
P.O. BOX 2350 STH HEDLAND W.A. 6722
BANKCARD WELCOME

NO. _____

SIGN. _____

EXP DATE _____



David Barrow presents more documented machine code routines and useful information for the assembly language programmer. If you have a good routine, an improvement or conversion of one already printed, or just a helpful programming hint, then send it in and share it with other programmers. Subroutines for any of the popular processors and computers are welcome but please include full documentation. All published code will be paid for. Send your contributions to SubSet, APC, 2nd Floor, 215 Clarence Street, Sydney 2000.

68000 series floating point

The nine Datasheets this month are all from Terry Browning, and form a floating-point arithmetic suite which should be assembled in the order given. Asterisks mark displacements to destinations in other Datasheets inside the suite.

Terry was inspired to this task by the Z80 floating-point suite in May but, due to the differences between the Z80 and the 68000, his suite is not a straight translation of the Z80 format.

The 32-bit internal architecture of the 68000 series processors means that a floating-point number with 24-bit mantissa and 8-bit

exponent can be accommodated in a single data register, but no 68000 operations can be performed on three-byte values without affecting the fourth byte so the exponent of each number has to be transferred to a second register for processing. As byte operations always use bits 7-0, the exponent is stored as the lowest-order byte in the packed number.

With the exponent moved to another register, 32-bits are available for dealing with overflow and rounding bits that result from operations on the 24-bit mantissa. 68000 bits and byte manipulation can be a complex subject, which is why I have included some useful hints on how to do it in my new book, *68000 Machine Code Programming*.

Any answers?

Terry would like to know why the square root algorithm works — this is a general problem. Many of the algorithms that have appeared in SubSet are not self-explanatory: we know they work and can be used on various precisions and formats, but have not

discovered why. Any short and clear explanations or references will be welcome.

Additions to the floating-point suite will also be helpful. Terry is primarily interested in routines to convert between binary and decimal floating-point formats for input and output so that he can convert the algorithms to Forth.

DATASHEET 1

ENTRY	Expand f.p. input numbers to working format.
JOB	To act as primary entry to floating point suite, save working registers on stack and expand f.p. compressed format numbers to working format.
ACTION	See comments.
CPU	68000-series
HARDWARE	None.
SOFTWARE	Called by FPSUB, FPADD, FPMUL, FPDIV and FPSQRT.
INPUT	D0 and D1 are two floating point numbers to the

format:	bits 31-8: 24-bit mantissa,		
	bits 7-0: 8-bit excess 128 exponent.		
OUTPUT	D1 to D5 are saved on stack.		
	CCR (NZVC all cleared) is on stack top.		
	D2.L = sign extended exponent of number D0.		
	D3.L = sign extended exponent of number D1.		
	D0(31-7) = expanded mantissa of number D0.		
	D1(31-7) = expanded mantissa of number D1.		
	D4 = sign extended exponent of zero number.		
ERRORS	None.		
REG USE	D0 D1 D2 D3 D4 CCR		
STACK USE	26		
RAM USE	None.		
LENGTH	44		
CYCLES	Not given.		
CLASS 1	*discreet	*interruptable	*promable
*****	*reentrant	*relocatable	*robust
ENTRY	MOVEM.L D1-D5, -(A7)	:Save registers used in f.p. suite.	48E7
	CLR.W D2	:Form new CCR for stack	4242
	ROXL.B #5, D2	:with all flags but X	EB12
	MOVE.W D2, -(A7)	:cleared.	3F02
	MOVE.B D0, D2	:Move exponent 1 to D2 and	1400
	EXT.W D2	:sign extend.	48B2
	CLR.B D0	:Clear mantissa 1 10-byte	4200
	ABR.L #1, D0	:and expand 24-bit mantissa	E2B0
	BCHG #30, D0	:to 25-bit for easier	0B40
		:overflow checks.	001E
	MOVE.B D1, D3	:Move exponent 2 to D3 and	1601
	EXT.W D3	:sign extend.	48B3
	CLR.B D1	:Clear mantissa 2 10-byte	42B1
	ABR.L #1, D1	:and expand 24-bit mantissa	E2B1
	BCHG #30, D1	:to 25-bit for easier	0B41
		:overflow checks.	001E
	MOVE.W #\$FFB0, D4	:Set D4 = sign extended "zero exponent".	3B3C
		:FFB0	FFB0
	MOVE.L Z2(A7), -(A7)	:Move return address to top of stack and return to main f.p. routine.	2F2F
			0016
	RTS		4E75

DATASHEET 2

EXIT	Floating point exit routines.
DZEXIT	Set division by zero flag and exit.
NBEXIT	Set negative input flag and exit.
OVEXIT	Set overflow flag and exit.
UFEXIT	Set underflow flag and exit.
RESULT	Compress working format result and exit.
JOB	To provide exit points compressing the f.p. result or setting appropriate error flags and restoring working registers saved by ENTRY.
ACTION	See comments.
CPU	68000-series
HARDWARE	None.
SOFTWARE	ENTRY must have stacked registers in the correct order.
INPUT	D0, D2 = f.p. result number (RESULT) or unknown error (all other entry points). Stack as after ENTRY with cleared CCR on top.
OUTPUT	reg/flag no error error
	D0 result uncertain
	D1-A7 as before ENTRY as before ENTRY
	X as before ENTRY as before ENTRY
	N result state 1 if negative input
	Z result state 1 if division by 0
	V 0 1 if any error
	C 0 0
ERRORS	None.
REG USE	D1 CCR (D2 is used but restored to value saved in ENTRY).
STACK USE	-26
RAM USE	None.

SUBSET

LENGTH	58		
CYCLES	Not given.		
CLASS 1	*discreet	*interruptable	*promable
*****	*reentrant	*relocatable	*robust
DZEXIT OR.W	##06,(A7)	:Set stacked V & Z flags to show division by zero, then exit.	0057 0066 602A
BRA	EXIT		
NGEXIT OR.W	##0A,(A7)	:Set stacked V & N flags to show negative input, then exit.	0057 006A 602A
BRA	EXIT		
OVEXIT OR.W	##02,(A7)	:Set only stacked V flag to show overflow error, then exit.	0057 0062 601E
BRA	EXIT		
UFEXIT OR.W	##04,(A7)	:Set only stacked Z flag to show underflow and set result exponent to "zero" value, then exit.	0057 0064 103C 0060 6014
MOVE.B	##00,D0		
BRA	EXIT		
RESULT CMP.B	##00,D2	:If result exponent is zero, then use underflow to set Z and zeroise. Else compress result mantissa into highest 3 bytes of D0. Show mantissa sign in stacked N flag.	0002 0080 67F0 E386 0040 001F 6004 0057 0008 1002
BEQ	UFEXIT		
ABL.L	#1,D0		
BCHG	#31,D0		
BNE	POSRES		
DR.W	##0B,(A7)		
POSRES	MOVE.B D2,D0	:Store result exponent.	1002
EXIT	MOVE (A7)+,CCR MOVEM.L (A7)+,D1-D5 ADDQ.L #4,A7 RTS	:Get result CCR. Restore registers, then clear return address stacked by call to ENTRY. Exit f.p. system.	44DF 4CDF 003E 58BF 4E75

DATASHEET 3

== JUSTFY	Justify or normalise f.p. number.		
JOB	To normalise a working format f.p. number by left justifying the mantissa with correcting adjustment to the exponent.		
ACTION	See comments.		
CPU	68000-series		
HARDWARE	None.		
SOFTWARE	UFEXIT.		
INPUT	D0 holds expanded floating point mantissa. D2 holds sign extended floating point exponent. D4 changed. D0 normalised. D2 contains exponent of normalised number.		
OUTPUT			
ERRORS	None.		
REG USE	D0 D2 D4 CCR		
STACK USE	0		
RAM USE	None.		
LENGTH	24		
CYCLES	Not given.		
CLASS 1	*discreet	*interruptable	*promable
*****	*reentrant	*relocatable	*robust
JUSTFY	BVS JUSTRR MOVEQ #23,D4	:Skip if already justified. Else set loop limit.	6910 7B17
JUSTLP	SUBQ #1,D2 ADD.L D0,D0 DBVS D4,JUSTLP	:Decrease exponent and left shift mantissa, until overflow (justified) or count out (not justified).	5342 D000 FFFA
BVS	JUSTRR	:Skip if justified, else clear return address and exit with underflow.	6904 58BF 60C6 *
ADDQ.L	#4,A7		
SRA	UFEXIT		
JUSTRR	ROXR.L #1,D0 ADDQ.W #1,D2 RTS	:Correct mantissa overflow and adjust exponent, then return to main routine.	E290 5242 4E75

DATASHEET 4

== FORMAT	Round and justify f.p. number.		
JOB	To round and justify working format f.p. number.		
ACTION	See comments.		
CPU	68000-series		
HARDWARE	None.		
SOFTWARE	JUSTFY, RESULT, UFEXIT, OVEXIT.		
INPUT	D0 holds expanded 25-bit floating point mantissa. D2 holds sign extended floating point exponent. D1 and D4 changed. V=0: D0 rounded to 24-bit value and normalised.		
OUTPUT			

CLASS 1	*discreet	*interruptable	*promable
*****	*reentrant	*relocatable	*robust
FORMAT	BGR JUSTFY	:Justify, then round up	61E6 *
MOVEQ	##40,D1	:any set bit in least	7240
ADD.L	D1,D0	:significant place - 1,	D081
BGR	JUSTFY	:then justify again.	61E0 *
ABR.W	#1,D2	:Test exponent by shifting	E242
ROXL.B	#1,D2	:and back to original place	E312
BVC	RESULT	:taking the exit	688C *
BOS	UFEXIT	:appropriate to the	6580 *
BRA	OVEXIT	:exponent condition.	60A8 *

DATASHEET 5

== XTSIGN	Extract mantissa sign & make absolute.		
JOB	To compute the product or quotient sign of two working format f.p. mantissas and return the absolute values of each.		
ACTION	See comments.		
CPU	68000-series		
HARDWARE	None.		
SOFTWARE	None.		
INPUT	D0 and D1 contain two's complement numbers.		
OUTPUT	D0 and D1 contain absolute values. bit 31,D4 = sign(D0) EOR sign(D1).		
ERRORS	None.		
REG USE	D0 D1 D4 CCR		
STACK USE	0		
RAM USE	None.		
LENGTH	20		
CYCLES	Not given.		
CLASS 1	*discreet	*interruptable	*promable
*****	*reentrant	*relocatable	*robust
XTSIGN	MOVEQ #1,D4	:Clear result sign.	7801
TST.L	D0	:Test 1st number and skip	4A80
BPL	NXTS1	:if positive (absolute),	6A04
NEG.L	D0	:else make absolute and	4480
NEG.W	D4	:change result sign.	4444
NXTS1	TST.L D1	:Test 2nd number and skip	4A81
BPL	NXTS2	:if positive (absolute),	6A04
NEG.L	D1	:else make absolute and	4481
NEG.W	D4	:change result sign.	4444
NXTS2	RTS	:Exit with result sign.	4E75

DATASHEET 6

== FPSUB	Floating point subtraction.		
> FPADD	Floating point addition.		
JOB	To subtract or add two f.p. numbers, returning correctly normalised result or error information.		
ACTION	See comments.		
CPU	68000-series		
HARDWARE	None.		
SOFTWARE	ENTRY, RESULT, JUSTFY, FORMAT.		
INPUT	D0 = 1st number, D1 = 2nd number.		
OUTPUT	no error error D0 result uncertain		
D1-A7	unchanged	unchanged	
X	unchanged	unchanged	
N	result state	0	
Z	result state	0	
V	0	1 = overflow	
C	0	0	
ERRORS	None.		
REG USE	D0 D1 CCR		
STACK USE	30		
RAM USE	None.		
LENGTH	62		
CYCLES	Not given.		
CLASS 1	*discreet	*interruptable	*promable
*****	*reentrant	*relocatable	*robust
FPSUB	BGR ENTRY	:Convert input numbers to expanded working format.	6100
CMP.W	D4,D3	:if 2nd no. = 0 then exit	B644
BEQ	RESULT	:with 1st no. as result,	679C *
EXG	D0,D1	:else exchange numbers,	C141

STOP PRESS

XyWrite III

Word Processing is here....

- **Multi-Column Documents**
 - Word Wrap within columns
 - Ideal for scriptwriters, translators, calendars
- **Windows**
 - Edit (nine) 9 files simultaneously
- **Full Proportional Spacing**
 - multiple font widths even in the same line
 - Word Wrap based on line width
- **Newspaper Column Printing**
- **Automatic Paragraph Numbering**
- **Styles**

Word Processing with exceptional **SPEED, FLEXIBILITY, and FUNCTION**

For more information or a demonstration diskette call:

Kowhai Systems

165 Queens Road, Connells Pt. N.S.W. 2221 Australia

Phone: (02) 546 6499

Dealer Enquiries welcome



Requirements IBM PC or Compatible with 256K memory DOS 2.0 or higher

768k bytes of ram for the Sanyo MBC-550 PC

Our new multi function card will add all the most wanted features to your Sanyo PC. Memory to 768k bytes, battery back up clock-calender, extra parallel port, RS-232/422 serial port with selectable baud rates.

Priced from **\$333.98.**

The board includes all necessary software plus JDT-DOS which supports 720k floppy disk drives, fast screen, keyboard type ahead buffer, memory disk & more.

Made in Australia by:

LC Logi-Com Pty. Ltd.

23 RINGWOOD ST., RINGWOOD, VIC. 3134. TELEPHONE (03) 870 5499

DATA PEN



KEYBOARD INTERFACE BAR CODE SYSTEMS

Most Popular P.C.'s

IBM
OLIVETTI
APRICOT
APPLE MAC
ERICSSON
NCR

Also Terminals

IBM
DEC
HONEYWELL
ICL
UNIVAC

No Software Mods No Port Addressing

Distributor — O.E.M. ENQUIRIES INVITED:



COMPUTER SERVICES PTY LTD

576 St. Kilda Road Melbourne Australia 3004

Telephone: 529 3866 Telex: 35942

SUBSET

	EXG	D2,D3	:and negate new 1st number	C543
	NEB.L	D0	:for addition of negative	4488
	BSR	JUSTFY	:value, justify it and	6182 *
	BRA	FPADDX	:go to addition test.	6810
	FPADD	BSR	ENTRY	:Convert input numbers to
				:expanded working format.
				6100
				FF52 *
	CMP.W	D4,D2	:Test 1st number and if no	8444
	BNE	FPADDX	:0 then skip, else	4688
	MOVE.L	D1,D0	:2nd number is result, so	2801
	MOVE.W	D3,D2	:move to result registers	3483
	BRA	RESULT	:and exit with result.	688E *
	FPADDX	CMP.W	D4,D3	:If 2nd number = 0 then
		BEQ	RESULT	:result is 1st number, else
				6444 *
	CMP.W	D3,D2	:test magnitudes, placing	8443
	BSE	ADDNUM	:largest in result	6C84
	EXG	D0,D1	:registers, D0 & D2.	C141
	EXG	D2,D3	:	C543
	ADDNUM	MOVE.W	D2,D4	:Get exponent difference
		SUB.W	D3,D4	:in D4 for later shift
		CMP.W	#24,D4	:count, but test for
			:shift count exceeding	0018
			:precision, if so exit	6200
			:with result = 1st no.	FF78 *
	BHI	RESULT	:	E8A1
			:Make 2nd mantissa same	D081
	ASR.L	D4,D1	:order as 1st and add it	
	ADD.L	D1,D0	:	
	BRA	FORMAT	:then format and exit.	60A6 *

DATASHEET 7

:= FPMUL Floating point multiplication.				
:JOB To multiply two f.p. numbers, returning correctly				
:normalised result or error information.				
:ACTION See comments.				
:CPU 68000-series				
:HARDWARE None.				
:SOFTWARE ENTRY, UFEXIT, XTSIGN, FORMAT.				
:INPUT	D0 = multiplicand, D1 = multiplier.			
:OUTPUT	reg/flag	no error	error	
	D0	product	uncertain	
	D1-A7	unchanged	unchanged	
	X	unchanged	unchanged	
	N	result state	0	
	Z	result state	0	
	V	0	1 = overflow	
	C	0	0	
:ERRORS	None.			
:REG USE	D0 D1 CCR			
:STACK USE	30			
:RAM USE	None.			
:LENGTH	52			
:CYCLES	Not given.			
:CLASS 1	*discreet	*interruptable	*promable	
:*****	*reentrant	*relocatable	*robust	
FPF24	BSR	ENTRY	:Convert input numbers to	6100
			:expanded working format.	FF24 *
	CMP.W	D4,D2	:Test 1st no. for zero and	8444
	BEQ	UFEXIT	:if so, exit via underflow	6700
			:to return zero result.	FF5E *
	CMP.W	D4,D3	:Test 2nd no. for zero and	8444
	BEQ	UFEXIT	:if so, exit via underflow	6700
			:to return zero result.	FF52 *
	BSR	XTSIGN	:Get absolute values and	6196 *
	MOVE.W	D4,-(A7)	:stack product sign.	3F04
	CLR.L	D5	:Clear product accumulator	4285
	MOVEQ	#24,D4	:Set mul loop count.	7818
	MULOP	ADD.L	D1,D1	:Test next multiplier bit
		BCC	MULPNA	:skip if no add this place
				6402
		ADD.L	D0,D5	:else add multiplicand.
				D480
		LSR.L	#10	:Shift multiplicand to next
				E288
		DBRA	D4,MULOP	:place, repeat for 25 bits
				51CC
			:ensuring correct rounding	FFF6
	ADD.W	D3,D2	:Add exponents.	D443
	PRODDT	MOVE.L	D5,D0	:Put mantissa in result reg
		TST.W	(A7)+	:and test result sign, skip
		BMI	PRODDI	:to 1 negate if negative.
				6802
		NEG.L	D0	:Negate at least once to
				4480
		NEG.L	D0	:give correct V flag.
				4480
		BRA	FORMAT	:Exit through format
				6000
			:routine.	FF6E *

DATASHEET 8

:= FPDIV Floating point division.	
:JOB	To divide two f.p. numbers, returning correctly

:normalised result or error information.				
:ACTION See comments.				
:CPU 68000-series				
:HARDWARE None.				
:SOFTWARE ENTRY, DZEXIT, UFEXIT, XTSIGN, PRODDT (in FPMUL).				
:INPUT	D0 = dividend, D1 = divisor.			
:OUTPUT	reg/flag	no error	error	
	D0	quotient	uncertain	
	D1-A7	unchanged	unchanged	
	X	unchanged	unchanged	
	N	result state	0	
	Z	result state	1 = division by 0	
	V	0	1 = error flag	
	C	0	0	
:ERRORS	None.			
:REG USE	D0 D1 CCR			
:STACK USE	30			
:RAM USE	None.			
:LENGTH	50			
:CYCLES	Not given.			
:CLASS 1	*discreet	*interruptable	*promable	
:*****	*reentrant	*relocatable	*robust	
FPDIV	BSR	ENTRY	:Convert input numbers to	6100
			:expanded working format.	FEF2 *
	CMP.W	D4,D3	:If 2nd number = 0 then	8444
	BEQ	DZEXIT	:exit setting "division by	6700
			:zero" error flag.	FF18 *
	CMP.W	D4,D2	:If 1st number = 0 then	8444
	BEQ	UFEXIT	:exit via underflow to	6700
			:return zero result.	FF24 *
	BSR	XTSIGN	:Get absolute values and	6100
			:quotient sign, saving	FF72 *
	MOVE.W	D4,-(A7)	:sign on stack for later.	3F04
	MOVEQ	#24,D4	:Set div loop count.	7818
	LSR.L	#1,D0	:Adjust dividend to prevent	E288
	ADDQ.W	#1,D2	:erroneous overflow.	5242
	DIVLP	SUB.L	D1,D0	:Try to subtract divisor,
		BCC	DIVOK	:skip if subtraction okay,
				6402
		ADD.L	D1,D0	:else add divisor back.
				D081
		ADDX.L	D5,D5	:Shift result complement.
				D085
		ADD.L	D0,D0	:Shift dividend one place
				D080
		DBRA	D4,DIVLP	:and repeat 25 times to
				51CC
			:ensure correct rounding.	FFF0
	NOT.L	D5	:Correct complemented	4685
	ASL.W	#7,D5	:result & move to position.	EF85
	SUB.W	D3,D2	:Subtract exponents and	9443
	BRA	PRODDT	:complete as for mul.	60BE *

DATASHEET 9

:= FPSQRT Floating point square root.				
:JOB To extract the square root of a f.p. number,				
:returning correctly normalised result or error				
:information.				
:ACTION See comments.				
:CPU 68000-series				
:HARDWARE None.				
:SOFTWARE ENTRY, UFEXIT, NSEXIT, FORMAT.				
:INPUT	D0 = square.			
:OUTPUT	reg/flag	no error	error	
	D0	root	uncertain	
	D1-A7	unchanged	unchanged	
	X	unchanged	unchanged	
	N	0	1 = negative input	
	Z	root state	0	
	V	0	1 = error flag	
	C	0	0	
:ERRORS	None.			
:REG USE	D0 CCR			
:STACK USE	30			
:RAM USE	None.			
:LENGTH	88			
:CYCLES	Not given.			
:CLASS 1	*discreet	*interruptable	*promable	
:*****	*reentrant	*relocatable	*robust	
FPSQRT	BSR	ENTRY	:Convert input number to	6100
			:expanded working format.	FEC0 *
	CMP.W	D4,D2	:If square = 0 then exit	8444
	BEQ	UFEXIT	:via underflow to	6700
			:return zero root.	FEF6 *
	TST.L	D0	:If square is negative	4A88
	BMI	NSEXIT	:then exit setting	6800
			: "negative input" flags.	FEF6 *
	ADDQ.W	#1,D2	:Root exponent by rounding	5242
	ASR.W	#1,D2	:and halving, correcting	E242
	BCC	SORTNS	:mantissa if exponent was	6482

SUBSET

ASL.L	#1,D0	:even.	E380
SQRTNS	ROL.L #8,D0	:Move mantissa into low	E198
MOVEQ	#8,D1	:byte D1 and high word D0,	7200
MOVE.B	D0,D1	:clearing all other bytes	1200
CLR.B	D0	:of D1,D0.	4200
MOVEQ	**#40,D3	:Set initial subtrahend.	7640
MOVEQ	#23,D4	:Set root loop count.	7817
SQLLOOP	SUB.L D3,D1	:Try subtracting part root	9283
BCC	SQLSUB	:and skip if okay, else	6402
ADD.L	D3,D1	:add back.	D283
SQLSUB	ROXR.B #1,D3	:Shift part root up one	E213
ADDX.L	D3,D3	:place getting corrected	D783
EDR.W	**#100,D3	:result in bit 8, leaving	0A43
		:bit 6 set.	0100
ADD.L	D0,D0	:Shift next bit pair of	D080
ADDX.L	D1,D1	:square remainder up into	D381
ADD.L	D0,D0	:place.	D080
ADDX.L	D1,D1	:	D381
DBRA	D4,SQLLOOP	:Repeat 24 times giving	51CC
		:24-bit chopped root.	FFEB
ROXR.L	#1,D1	:Extract last bit	E291
LSR.L	#1,D3	:for rounding.	E28B
CMP.L	D3,D1	:	B283
BCC	SQRTNX	:	6504
OR.B	**#40,D3	:	0003
		:	0040
SQRTNX	MOVE.L D3,D0	:Move root to result reg	2003
BRA	FORMAT	:and exit after formatting.	6000
		:	FEF2 *

END

YOUR ATTENTION
PLEASE!

☆ ☆ ☆

Important information
for
Dot Matrix Printer
owners

*This is a demonstration of
what is possible with a dot
matrix printer and*

**DOT
MATRIX GRAPHICS**
in which

Just programmes are presented
which will enable the user
to build fonts like these.

Different combinations of these can produce
impressive documents interesting manuscripts
and

also tailor made greeting cards, diplomas,
elegant nuptial effects and portraits

FOR FURTHER INFORMATION WRITE TO

JOMAR BOOKS, 10 BATEMAN STREET, STRATHPINE,

QUEENSLAND 4500

BACKUP

YOUR DISKS

\$98.95

plus \$2.00 postage & packaging

ESSENTIAL DATA DUPLICATOR III™

EDD runs on Apple II, II plus, IIc and Apple III (in emulation mode) using one or two disk drives. EDD allows you to easily and quickly make back up copies of your "uncopyable" Apple disks.

Since EDD has been preset to copy the widest range of copy-protections possible, you just simply boot up EDD, put the disk you want to copy in one disk drive and a blank disk in the other (EDD will work using one drive also) and in about 2 1/2 minutes a copy is made.

Unlike the "copy-cards" which only copy "single load" programs, EDD copies the entire disk.

This would be similar to hooking up two cassette recorders, playing from one, and recording to the other.

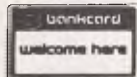
We have even included an option so you can check the speed of your disk drives because drive speeds running fast or slow can damage disks and cause other problems.

We publish EDD program lists (information about copy-protected disks) every couple of months, which EDD owners can receive. The current list is included with the purchase of EDD.

The bottom line is this; if EDD cant copy it, chances are nothing will.

Warning: EDD is sold for the sole purpose of making archival copies ONLY.

To order your copy send cheque or money order to
UTILCO SOFTWARE 83 Hall Street, Bondi Beach.
NSW 2026 AUSTRALIA. Telephone (02) 30 2105



Order by phone:



VIATAL
COMPUTERS

168 Elgar Road, Box Hill, 3128
Telephone 288 3107 — 288 3611
Telex AA34391 DORVAL

MODEMS from **\$190** — 300-1200/75
Software for Viatal Service
Over 100 Meg of Public Domain
Software **\$10** — any volume

Join our RBBS — Phone 288 3599 (300 baud)

APL Power Supplies **\$95**
Joy Sticks **\$30**
80 Col Cards **\$95**
Printer Cards W/cable... **\$95**
Speech Cards **\$50**
Disk Controller **\$45**
Super Serial **\$110**
PC Joy Sticks **\$40**
Disk Boxes holds 100 **\$25**
Disks DD/DS **\$30**

**PC-AT
COMPATIBLES**
20 Meg Hard Drive
1.2 Floppy Drive

\$5895

PC-XT
FROM

\$1350

WE SERVICE
& REPAIR

NEW YEAR SPECIAL FROM COMMANDGLEN

COMMODORE

Commodore 128 Computer	610.00
Commodore Family Pack	445.00
Commodore 64	385.00
Commodore SX64	1250.00
1541 Disk Drive	325.00
803 Printer	310.00
1801 Colour Monitor	450.00
Plus more!	

STORAGE BOXES

DX60 5.25 inch lockable	22.00
DX85 5.25 inch lockable	28.00
5.25/8 inch library boxes	6.00

PAPER

9.5 x 11 60 gsm 2000 sheets	35.00
9.5 x 11 70 gsm 2500 sheets	50.00
True A4 70 gsm 2500 sheets	55.00
15 x 11 BMO 2500 sheets	35.00
Plus multiform carbon incl. and carbon less	

MEMOREX

SSSD 5.25 inch	28.00
SSDD 5.25 inch	32.00
DSDD 5.25 inch	42.00
SSSD 8 inch	45.00
SSDD 8 inch	50.00
DSDD 8 inch	55.00
3.5 inch	65.00

MISCELLANEOUS

Monitor amber/sound 35 mhz	190.00
Xetec Interface for Commodores to suit most parallel printers	110.00
Smart Cable Instant RS232 Connection	140.00
Data Cartridges	from 40.00
Printer Cables parallel or serial custom built	from 30.00
Modem to suit Commodore 64	
Cicada 300C	190.00
Thomson Colour Monitor/TV 14 inch	
Remote Control RGB/Pal input	500.00

THIS MONTH'S SPECIAL

DEALER ENQUIRIES WELCOME

OLYMPIA NP165

FAST 165 CPS

NLQ mode selectable by software or switch

Big 2K Buffer

\$475.00

36 Campbell Drive, Wahroonga 2076.
Ph: 487 3224

FREE DELIVERY IN SYDNEY
METROPOLITAN AREA FOR ORDERS
EXCEEDING \$350

Phone 7 days a week or mail orders to the above address

Also Distributors for

MEMOREX — DISKETTES/TAPES
OLYMPIA — PRINTERS
COMMODORE
SNAP APART. — PAPER SUPPLIES
ADVANCE — PRINTER RIBBONS
IMAGINEERING — SOFTWARE SUPPLIES

*All prices include sales tax

Interpretative Logo

Harvey Mellar concludes his Teach Yourself Logo series by putting the language into practice: he writes a mini-Logo interpreter in Logo.

In this final part of the Logo series, I'll describe Logo using Logo itself. I am going to write a mini-Logo interpreter in Logo. This kind of circularity is not as silly as it may sound; after all, we do it all the time with human languages.

Two major benefits are expected to come from writing this interpreter. Firstly, a better understanding of how Logo works. Secondly, I'll be developing an outline for a real Logo interpreter, which could form the basis for writing the interpreter in another language.

The interpreter will deal with the Logo fundamentals such as list processing, conditionals, attaching values to inputs, controlling recursion and defining new procedures, but will omit a lot of the frills.

Given these basic features, you could go on to write procedures in mini-Logo that would expand its capabilities to resemble those of a full Logo.

Clearing the ground

Before going on to a detailed description of the interpreter, it's worthwhile having a quick look at a few 'helping' operations and some new primitives that are used by the program.

Within the interpreter, several sets of values are stored as 'association lists'. A simple example of an association list would be a list of company personnel together with their telephone extension numbers. We might have Jones on extension 325, Smith on 643, and so on. Each name is associated with an extension number, so the telephone list is a collection of pairs such as [JONES 325] and [SMITH 643]. Within these pairs the first part (the name in this case) is referred to as the key, and the second part (the extension number here) as the value. The telephone 'association list' is the list made up of these pairs — [[JONES 325] [SMITH 643]].

We shall only need to perform two kinds of operations on association lists — adding a new pair to the list, and looking up the value corresponding to a particular key.

```
M.ADD adds a new element to a list,
TO M.ADD :KEY (VALUE :ALIST
  OUTPUT FPUT LIST :KEY :VALUE
  :ALIST
END
```

As an example, M.ADD "ALLEN 543 [[JONES 325] [SMITH 643]] would output [[ALLEN 543] [JONES 325] [SMITH 643]].

Looking up values is done by M.ENTRY. This either returns a list composed of the key together with its value, or it returns the empty list if the key is not in the list.

```
TO M.ENTRY :KEY :ALIST
  IF EMPTY? :ALIST THEN OUTPUT []
  IF :KEY = FIRST FIRST :ALIST THEN
    OUTPUT FIRST :ALIST
  OUTPUT M.ENTRY :KEY BUTFIRST
  :ALIST
END
```

There are two other 'helping' functions used in the program — M.BUT and M.REMOVE.QUOTES.

```
TO M.BUT :N :LIST
  IF :N = 0 THEN OUTPUT :LIST
  OUTPUT M.BUT :N - 1 BUTFIRST
  :LIST
END
```

M.BUT is an extension of BUTFIRST; it is used to remove several elements from the front of a list. M.BUT 3 [A B C D E] returns [D E] — the list minus its first three elements.

```
TO M.REMOVE.QUOTES :LIT
  IF WORD? :LIT THEN IF FIRST :LIT = "
  " THEN OUTPUT BUTFIRST :LIT
  OUTPUT :LIT
END
```

M.REMOVE.QUOTES is used to remove the quotes from the front of a word. This procedure is needed as Logo is somewhat inconsistent in the way it handles words. Numbers are regarded as words and yet they do not need to be preceded with the quote sign like other words.

M.REMOVE.QUOTES removes the " from any word which has it, but leaves other inputs untouched.

I've introduced three new primitives in this program, but none of them involve any very new ideas.

LOCAL enables you to declare a variable as local to a procedure.

SENTENCE takes two inputs and puts them together to make a list, which is slightly different in effect from FPUT. FPUT [A] [B C] produces [[A][B C]] whereas SENTENCE [A] [B C] produces [A B C].

ITEM is used to get at an element of the list other than the first. ITEM 3 [A B C D E] returns the third element of the list, that is, C.

The interpreter

All procedures used to implement the interpreter begin with M. (for example, M.RUN, M.APPLY) and all primitives in the mini-Logo begin with * (for example, *FIRST, *DEFINE).

The interpreter only deals with a few primitives and it makes some simplifying assumptions about the form of its input, so I'll explain first what it can and can't do.

The interpreter implements the operations *FIRST, *BUTFIRST, *FPUT, *EMPTY? and the commands *OUTPUT, *IF, *STOP, *DEFINE, and *PRINT.

A single line of direct input, or any line of a procedure, must consist of a command optionally followed by one or more operations together with their inputs. For example, *PRINT *FPUT *BUTFIRST [X Y Z] *FIRST [[A B C] [D E F]].

*IF is a command, although in standard Logo IF can be either a command or an operation. It must be followed by three lists: the first represents the condition; the next the action to be performed if the condition is true; and the last the action if the condition is false. The action parts must either be of the same form as a line of input or be the empty list. For example:

```
*IF [*EMPTY? [A F]] [*PRINT "YES]
[*PRINT "NO]
```

The mini-Logo does not include an editor; procedures are defined using *DEFINE. The format used is shown by this example:

```
*DEFINE "TRI [[:LIST] [*PRINT :LIST]
```



```
[*IF [*EMPTY? :LIST] [*STOP] []] [TRI
* BUTFIRST :LIST]]]
```

which corresponds to the more normal way of writing the definition:

```
TO TRI :LIST
*PRINT :LIST
*IF [*EMPTY? :LIST] [*STOP] []]
TRI *BUTFIRST :LIST
```

END

The definitions of procedures are kept in a global variable called PROCEDURES. This is an association list in which the procedure name is the key, and the value is the text of the procedure definition. One item of PROCEDURES might be:

```
[TRI [[:LIST] [*PRINT :LIST] [*IF [*EMPTY? :LIST] [*STOP] []] [TRI *BUTFIRST :LIST]]]
```

There are two other global variables used in the program:

PRIM.LIST — this is an association list consisting of the names of the primitive operations of mini-Logo together with the number of inputs they take.

DONE — this is a flag indicating when a *STOP command has been met.

The values of local variables (or inputs) are kept in a local variable called VARS. This is another association list in which each element consists of the name of the variable plus its value.

How the program works

To start the interpreter for the first time use M.SETUP; this initialises PRIMLIST and clears out the procedure list before it calls M.LOGO. To keep the procedure definitions from a previous time, you would simply begin with M.LOGO.

M.LOGO prints a prompt, receives a line of input from the keyboard, and sends it for evaluation to M.RUN. The other input to M.RUN represents the association list containing the variables, which is initially empty. M.RUN will always return a value. This value should be the empty list if everything is OK: if anything else is passed back, an error message is given by M.REPORT.

M.RUN does much of the heavy work of the interpreter. It evaluates the first element in the input line and decides how to proceed with evaluating the rest of the elements in the line. There are five possibilities:

- 1) The line is empty, in which case it stops and outputs [].
- 2) The first element is a constant (M.CONSTANT? is used to check for this), in which case it leaves it alone (other than stripping the quotes from before words) and adds the result onto a list formed by evaluating the rest of the line.
- 3) The first element is a variable, in which case it replaces the variable by its



value. It is the task of M.VALUE to determine this value or signal an error if there isn't one. The result is added onto a list formed by evaluating the rest of the line.

4) The line is a conditional. It depends on the result of evaluating the condition as to which of the other two lists is evaluated. The task of running the correct set of actions is handled by M.IF.

Look closely at how M.IF works. The first thing done is (M.RUN :COND) and this either has the result [TRUE] or [FALSE]. The first element of this result is then TRUE or FALSE. The trick is to treat this result as a variable name and get the value associated with it by using THING. This gives one of the action lists, which can then be run by M.RUN.

5) None of the above apply, so the first element must be the name of a procedure (whether primitive or user-

defined). It evaluates the rest of the line and passes the result over to M.APPLY so that it can apply that procedure to the list of inputs.

Within M.APPLY there are three sets of options:

1) The procedure is a primitive command, in which case it is carried out and processing is halted by outputting a value (usually []). *DEFINE causes a call to M.DEFINE which adds the definition to the front of the list PROCEDURES.

2) The procedure is a primitive operation, in which case the operation and its inputs are replaced by their result within the input line, and the new line is output. This involves determining from PRIM.LIST how many inputs the operation is supposed to have.

3) The procedure is a user-defined procedure; in this case the task is passed over to M.APPLY.PROC.

M.APPLY.PROC calls on M.DEFN to


```

TO M.SETUP
  MAKE "PRIM.LIST ((M.FIRST 1) (M.BUTFIRST 1) (M.FPUT 2)
  (M.EMPTY? 1))
  MAKE "PROCEDURES {}
  M.LOGO
END

TO M.LOGO
  PRINT: "
  I RUN THE NEXT LINE INPUT FROM THE KEYBOARD
  I BETTING THE LIST OF LOCAL VARIABLES TO {}
  M.REPORT M.RUN REQUEST {}
  M.LOGO
END

TO M.REPORT :RESULT
  IF NOT EMPTY? :RESULT THEN PRINT IYOU DONT SAY WHAT ID DO
  WITH RESULT:
END

TO M.RUN :S :VARS
  I EMPTY
  IF EMPTY? :S THEN OUTPUT {}
  LOCAL "SYMBOL LOCAL "REST
  MAKE "SYMBOL FIRST :S
  MAKE "REST BUTFIRST :S
  I CONSTANT
  IF M.CONSTANT? :SYMBOL THEN OUTPUT FPUT ( M.REMOVE.QUOTES
  :SYMBOL ) ( M.RUN :REST :VARS )
  I VARIABLE
  IF FIRST :SYMBOL = " THEN OUTPUT FPUT ( M.VALUE BUTFIRST
  :SYMBOL :VARS ) ( M.RUN :REST :VARS )
  I CONDITIONAL
  IF :SYMBOL = " THEN OUTPUT M.IF ( FIRST :REST ) ( ITEM 2
  :REST ) ( ITEM 3 :REST ) :VARS
  I PROCEDURE
  OUTPUT M.APPLY :SYMBOL ( M.RUN :REST :VARS ) :VARS
END

TO M.CONSTANT? :X
  IF NUMBER? :X OUTPUT "TRUE
  IF LIST? :X OUTPUT "TRUE
  IF FIRST :X = "" OUTPUT "TRUE
  
```

A mini-Logo interpreter written Logo

```

OUTPUT "FALSE
END

TO M.VALUE :NAME :VARS
  LOCAL "VAR
  MAKE "VAR M.ENTRY :NAME :VARS
  IF EMPTY? :VAR THEN ( PRINT (THERE IS NO NAME) :NAME )
  TOPLEVEL
  OUTPUT LAST :VAR
END

TO M.DEFINE :S
  MAKE "PROCEDURES M.ADD || FIRST :S || ( LAST :S ) :PROCEDURES
  ( PRINT FIRST :S "DEFINED )
END

TO M.IF :COND :TRUE :FALSE
  OUTPUT M.RUN THING FIRST ( M.RUN :COND :VARS ) :VARS
END

TO M.APPLY :PROC :INPUTS :VARS
  LOCAL "RESULT LOCAL "NUMB
  I PRIMITIVE COMMANDS
  MAKE "DONE "FALSE
  IF :PROC = "DEFINE THEN M.DEFINE :INPUTS OUTPUT {}
  IF :PROC = "STOP THEN MAKE "DONE "TRUE OUTPUT {}
  IF :PROC = "PRINT THEN PRINT :INPUTS OUTPUT {}
  IF :PROC = "OUTPUT THEN OUTPUT :INPUTS
  I PRIMITIVE OPERATIONS
  IF :PROC = "FIRST THEN MAKE "RESULT FIRST FIRST :INPUTS
  IF :PROC = "BUTFIRST THEN MAKE "RESULT BUTFIRST FIRST
  :INPUTS
  I INPUTS
  IF :PROC = "FPUT THEN MAKE "RESULT FPUT FIRST :INPUTS ITEM
  2 :INPUTS
  IF :PROC = "EMPTY THEN MAKE "RESULT EMPTY FIRST :INPUTS
  I REPLACE THE OPERATION AND ITS INPUTS
  I WITHIN IN THE LIST BEING INTERPRETED
  I BY THEIR RESULT
  MAKE "NUMB M.ENTRY :PROC :PRIM.LIST
  MAKE "NUMB CONTAINS A VALUE IF :PROC IS A PRIMITIVE OPERATION
  OTHERWISE IT WILL BE EMPTY
  
```

```

IF NOT EMPTY? :NUMB THEN OUTPUT FPUT :RESULT M.BUT ( LAST
:NUMB ) :INPUTS
I GET DEFINITION
OUTPUT M.APPLY :PROC :PROC :INPUTS :VARS
END

TO M.APPLY :PROC :PROC :INPUTS :VARS
  LOCAL "PROCEDURE LOCAL "NUMB
  MAKE "PROCEDURE M.DEFN :PROC
  MAKE "NUMB COUNT FIRST :PROCEDURE
  I REPLACE THE PROCEDURE AND ITS INPUTS
  I WITHIN THE LIST BEING INTERPRETED
  I BY THEIR RESULT
  OUTPUT SENTENCE ( M.RUN :PROC BUTFIRST :PROCEDURE ( M.ASSIGN
  FIRST :PROCEDURE :INPUTS :VARS ) ) ( M.BUT :NUMB :INPUTS )
  END

TO M.DEFN :NAME
  LOCAL "DEFN
  MAKE "DEFN M.ENTRY :NAME :PROCEDURES
  IF EMPTY? :DEFN THEN ( PRINT (THERE IS NO PROCEDURE NAMED)
  :NAME ) TOPLEVEL
  OUTPUT LAST :DEFN
  END

TO M.RUN :PROC :LIST :VARS
  LOCAL "RESULT
  I FINISHED?
  IF EMPTY? :LIST THEN OUTPUT {}
  I RUN NEXT LINE OF THE PROCEDURE
  MAKE "RESULT M.RUN FIRST :LIST :VARS
  IF :DONE THEN MAKE "DONE "FALSE OUTPUT {}
  IF NOT EMPTY? :RESULT THEN OUTPUT :RESULT
  I RUN THE REST OF THE PROCEDURE
  OUTPUT M.RUN :PROC BUTFIRST :LIST :VARS
  END

TO M.ASSIGN :NAMES :VALUES :VARS
  IF EMPTY? :NAMES THEN OUTPUT :VARS
  OUTPUT M.ASSIGN ( BUTFIRST :NAMES ) ( BUTFIRST :VALUES )
  M.ADD BUTFIRST FIRST :NAMES FIRST :VALUES :VARS
  END
  
```

look up the definition of the procedure or give an error message if it is not found. The definition of the procedure together with the values of its inputs (which are assigned to the local variables by M.ASSIGN) are sent to M.RUN.PROC to evaluate, and the result is used to replace them within the input line.

M.RUN.PROC calls upon M.RUN to run the procedure line by line, keeping a look-out for the DONE flag being set, indicating the end of a procedure.

We could hardly hope to write a full interpreter in so short a space. There are a number of problems with the program, some of them quite major, others fairly minor. Here's a few to be going on with:

1) There are no turtle graphics and no arithmetic. The arithmetic is the bigger problem, particularly if infix operations are required.

2) We have, in effect, made all commands into operations, since everything passes back a result even if it is only the empty list. Advocates of functional programming might well

claim that this is no bad thing!

3) New procedure definitions are added at the front of the list PROCEDURES — they do not replace old definitions of the same name, as they should.

4) There is almost no error handling.

5) Each mini-Logo primitive has a fixed number of inputs, whereas in standard Logo many primitives can have a variable number of inputs.

6) I have not touched the problem of global variables, or that of changing the value of variables within a procedure by using MAKE.

I've left plenty for you to do!

Conclusion

My intention in this series has not been to give you examples of perfect Logo programs which you can copy, but rather to give starting points for exploring and developing new programs. I have taken a few ideas to some depth because it is important to point out just how Logo could be used to deal with them.

Logo's strengths lie in its ease of use and its power. It has limitations, the most obvious of which are its slowness and greediness for memory. More fundamental criticisms of the language attack it for having moved away from the pure "functionalism" of Lisp towards becoming a more procedural language. At the moment, Logo is primarily a language for learning, for experimentation, and for having fun with.

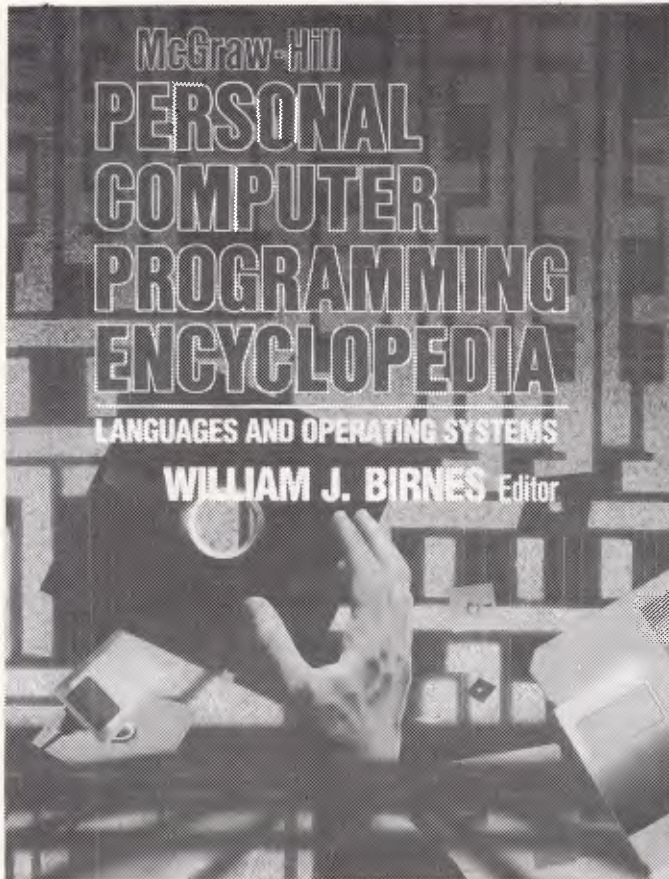
Four years ago Logo was an almost unknown language outside university education departments. Today all major personal computers have a version of it, and many companies now bundle Logo as well as Basic with their home machines — for example ACT, Amstrad and Atari. In another four years, perhaps it will be Basic that is the virtually unknown language.

This is part six of six-part series.

END



David Taylor wades through an impressive encyclopaedia for Apple's impressive Mac and is told what's what in peripherals, in this month's review of computer literature.



Wotta lot I got!

This whopping tome makes a number of assumptions. It assumes for a start that you might find a small pan-technicon to help you cart it home. It assumes you'd like a fistful of loosely connected essays outlining the first principles of program design, graphics, robotics or how chips are arranged. It assumes you might find it handy to have listed in one vast, door-stopping volume the principal commands of no fewer than 19 programming

languages, including Ada, Algol, C, Cobol, Forth, Fortran, Lisp, Pascal, Prolog and SAM76, as well as good-old Basic and a number of software command languages like dBasell, VisiCalc or Framework. It assumes you can assimilate a whistle-stop tour of such classic operating systems as CP/M, MS-DOS, Unix or Macintosh. And it assumes you're daft enough to blow \$150 on this job lot.

Like most books with umpteen contributors, this is a patchy and bewildering mix. It contains so much that I suppose you are bound to hit on something to grab your atten-

tion, but without any pertinent structure, and with so little pursued beyond a kind of *hors d'oeuvre* for each topic, it is hard to see what you'll get out of it beyond the mild fascination of a year or so of idle browsing.

In a bid to live up to its user-friendly claims, the text will from time to time sink into wool-gathering absurdity: 'A keyboard is a set of switches, the closing of any one of which causes a unique code to be generated.' At other times it will skitter through a subject of numbing complexity as if it were a piece of cake to master (Ada is despatched in nine pages). Then it cannot resist fatuous wanderings into hillbilly philosophy: 'A traditional view of humans sees the individual as a duality: body and mind. This is probably too simple a picture.'

And it is lumbered with a glossary which contains such breathtaking definitions as: 'ACCURACY — the degree of freedom from error', or 'VENDOR — a company that supplies material.'

As you continue to ask yourself what all this is *for*, apart from an occasional rummage or quick reference, editor Birnes says his encyclopaedia's information is tailored to save time and work, to aid in decision-making, to enhance the value of any computer, and to stimulate new approaches to language applications. And I say pull the other one.

Title: Personal Computer Programming Encyclopaedia
Editor: William J Birnes
Publisher: McGraw-Hill
Price: \$140.95

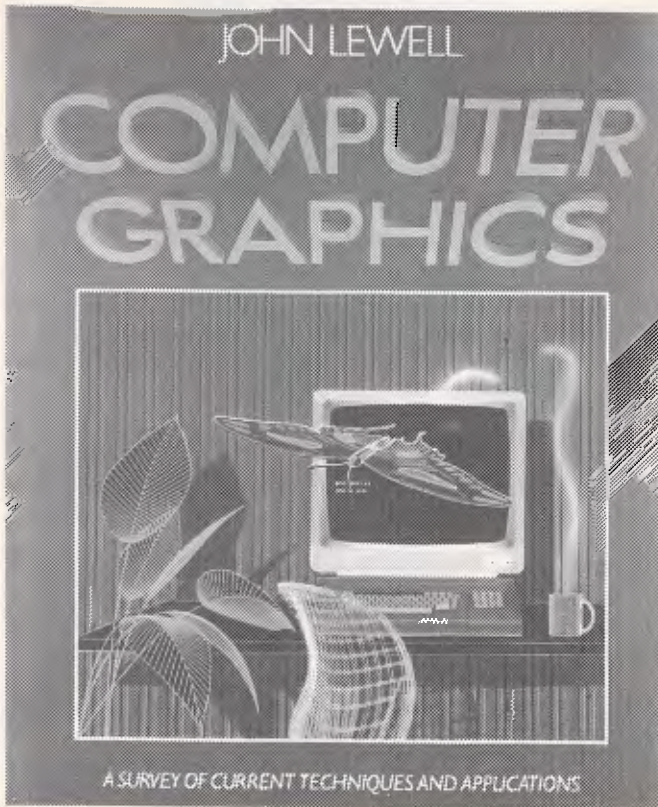
Nights drawing in

In the still watches of the night, after a feverish day of word processing, database rummaging and occasional bursts online to some far-flung host, after I've checked the electronic mail boxes, backed up a few irreplaceable files and put the dog out prior to turning in, there's often the temptation to spend a heavy-lidded half-hour with Microsoft's mesmerising Flight Simulator.

As off we bob from Meigs Field, the simulated Cessna and I, I'm invariably struck by the program's ingenuity, its vivid appeal to Biggles-ish imagination, and its frankly pig-awful graphics. The sad

fact is that computer graphics are a bit of a let-down on all but the most sophisticated (and pricey) of machines. Micro manufacturers make extravagant claims, suggesting that all their graphics are streets ahead of a pen and paper, but whereas the meaning or even insight may be clear enough, it's doubtful if the image will be up to much. Alien bugs might be absorbing, or pie charts instructive, but such typical micro graphics are scarcely breathtaking visual art.

Just about everything in John Lewell's slim but handsomely illustrated survey is, on the other hand, state-of-the-art. After a hurried introductory section defining terms, and an irritating chunk which tries to precis what all computers do ('A computer



does nothing until it is given a role to play) he gets down to business with a review of hardware: vector and raster displays, host computers, display processors and sophisticated I/O devices. All this is fascinating stuff and all of it way beyond the means of any amateur, hence his next section on current applications — in industry, specialised sciences from medicine to space, films, TV and publishing, plus high-powered, big-budget business.

This is where the ooh-er pictures are at their densest and beautifully presented they are, too. The author seems almost spiritually affected by the wonder of it all and concludes with an impassioned, if rather woolly speculation of where it's all likely to lead. Parts of this are unintentionally black comedy ('The CIA rarely gives a presentation to the US President without the support of

computer-generated analytical graphics') and other parts absurdly bleak ('By enhancing sight at the expense of touch we may literally be *losing touch* with reality... high technology may simply enhance our ability to build factories, destroy landscapes, upset delicate ecosystems and create an urban wasteland').

Computer-stimulated philosophy is seldom my cup of tea, any more than quick chapters summarising progress since Babbage. Inbetween these regrettable extremes of indulgence, John Lewell has a good primer on professional-standard graphics, I can't wait for a flight simulator on a parallel-processing set-up one of these days, or nights.

Title: Computer Graphics
 Author: John Lewell
 Publisher: Orbis
 Price: \$29.95

irritatingly *tock-tock* touch of its rather tatty Toytown keyboard, I'd certainly be happy to spend most of my own micro time mousing about with a Mac. So much of its latest software — Mac-Publisher, Music Works and most especially Jazz — is streets ahead of the field.

With an add-on Winchester, a 512k Mac is fast as well as versatile, and can easily give IBM XTs a hard time.

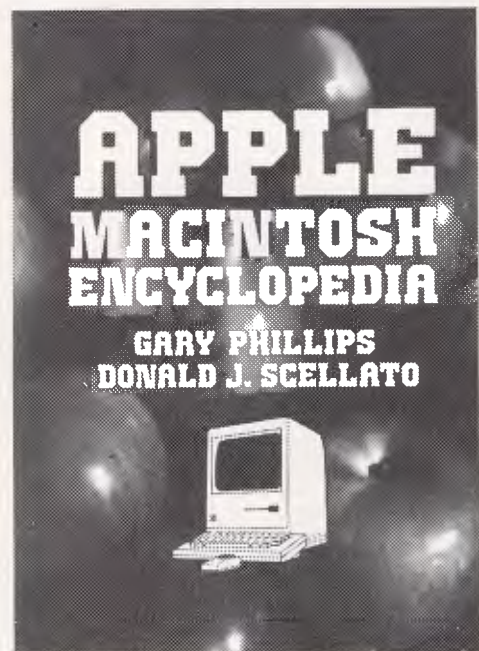
Few machines are quite as well-packaged as a Mac. The thing itself, plus peripherals like its Imagewriter and the much pricier but astonishing Laserwriter, are ergonomically top notch and astutely documented, too. Bear that fact in mind, together with the mouse's inherently simple point-and-do felicity, and you can soon start to wonder *who needs a book?*

I wondered quite a lot as I waded through this jam-packed encyclopaedia. Lots of condensed information (at least for the standard 128k model) is all in there, but for every snippet you might

without this: 'Power On — Turn the power switch to the ON position or otherwise supply electric current to a device.' Or how about this cryptic, almost poetic item? 'File, Erase (Microsoft BASIC) See KILL.'

To an extent, of course, all reference books suffer from such over-stuffing and are scarcely meant to be read cover to cover, any more than is a phone book. Now and again, it will perhaps be handy to reach for the Mac encyclopaedia to get yourself out of a knot (and for your \$29.95 you do get plenty of potential opportunities). It's accurate, but dull.

For would-be MacTutors, the unfortunate fact remains that operation of a Mac is so transparent. Hand-holding manuals or what-it-all-means primers are having a thinner time than they used to have, unscrambling DOS or annotating daunting software. This is a shame for authors as assiduous as Messrs Phillips and Scellato. Mac users, on the other hand, might well not give much of a damn.



actually need there are certain to be dozens of others which are either (a) absurdly obvious or (b) irrelevant.

Ask yourself, for example, whether you could get by

Title: Apple Macintosh Encyclopaedia
 Authors: Gary Phillips & Donald J Scellato
 Publisher: Chapman & Hall
 Price: \$29.95

**Frankly,
 my dear . . .**

Apple's Mac is a marvellous

micro: sharp as they come (for the price) and so user-friendly it practically shakes hands and makes a pot of tea every time you power-up.

Were it not for the

This Back Issues listing has been updated to include all of the available 1985 issues of APC. A postage-paid order form is between pages 96 and 97. Please allow up to four weeks for delivery.



Volume 2 No 3, 1981
 Checkout: Sinclair ZX81/APC-80: Recovering lost programs. JUMP command (allows a GOTO "numeric expression")/ Building a Bigboard/Keystroke reduction for EDTASM users/ Sanders Printer reviewed/Profile of BS Microcomp/CP/M explained by Rodney Zaks/The rapid bubble sort for the Apple/ Encryption for any Microsoft Basic/An imagined 6502 "Dream Machine" specs/Vectors explained on the Challenger IP/ Programs: TRS-80 flashing cursor and non-destructive backspace. Treasure Hunt (PET).

Volume 2 No 4, 1981
 Benchtest: VIC-20, Tandy TRS-80 III/TRS-80 Monitor software compared/Computer Games: Backgammon on micros/Tree access routines explained/Gateways to Logic. Part 8: Peripherals/How Computers Communicate. Part 1: What is I/O?/ Profile Gary Blom of the Computer Company/Part 1 of 2: Defining program specification needs/6502 Assembler in Basic/ Wordpower wordprocessor program for the PET/Programs: PET Arithmetic Test, Apple Mondrian.

Volume 3 No 2, 1982
 Checkout: Apple III/Fitting a smooth curve to complex data plots/Speech synthesis for TRS-80s. System 80s. Part 2/"Bridge" on micros/Relocating assembly language programs/Binary sort explained/Programmable rhythm generator project for PET/Large number calculations on micros/ Basic interpreters explained/ Checkout: ZX81 printer/APC-80 overview and debounce routine/Storing arrays on tape/ Frames of Reference. Part 1: A DP manager's guide to micros/ How Computers Communicate. Part 4: The IEEE interface/ Overview of micro-computer databases/Programs: TRS-80 Alien Seabattle.

Volume 3 No 4, 1982
 Benchtests: Osborne 01, Micro Bee/APC-80: Command mode syntax error recovery/How Computers Communicate Part 6: The RS232 interface/80 x 24 display controller project/Preview of the Commodore 64/Atari 400 games reviewed/Profile: Adam Osborne/ ANS Basic's features/Solving the hidden surface problem in 3D graphics/Frames of Reference. Part 3: Micros in mainframe company/Hewlett Packard's networking capability/Programs: TRS-80 Reaction Timing. ZX81 Graphplot, PET Cheese, Superboard Spin-Fighter, TRS-80 Extra.

Volume 3 No 5, 1982
 Benchtests: Texas Instruments TI 99/4A, Xerox 820/Database Benchtest: FMS-80/TRS-80 Model 1 games reviewed/Frames



of Reference. Part 4: Software standards/How Computers Communicate. Part 7: Interrupts in micro systems/How to use 3D graphics/Equation solving program/80 x 24 display controller project. Part 2/"Logo" Overview/ Printer survey/Casio's calculator printer/Programs: TRS-80 Double Precision Maths and Tng, Apple 3D Maze, Atari Sums for Kids, Apple Air Flight.

Volume 3 No 6, 1982
 Benchtests: Sinclair ZX Spectrum, Sirius I/Database Benchtest: dBase II/7th West Coast (micro-computer Faire)/ Checkout: F-10 Daisywheel printer, Arfon Expandboard/ How Computers Communicate. Part 8: Direct memory access/ Frames of Reference. Part 5: Buying micro hardware in a DP department/Self learning program/80 x 24 display controller project. Part 3 (end)/How to get more on Apple disks/Lisp — an artificial intelligence language/ VIC-20 games reviewed/Implementing CP/M system calls from Microsoft Basic/APC Subset (first on new monthly column for assembler language routines)/ Programs: TRS-80 Invader, PET Mini-animate, VIC-20 Trailblazer, ZX81 Book Index, Weebie Monitor (TRS-80), VIC-20 Large Characters.

Volume 3 No 7, 1982
 Benchtests: Sharp MZ80B, Monroe OC 8820/Checkout: Sharp PC1500. The Micro-Professor/Apple II games reviewed/APC-80: Various PEEKs and POKEs explained/ Reversing images on computer screens/Frames of Reference. Part 6: Putting your micro to work/How Computers Communicate. Part 9: Character codes/Educational arcade-type game/Programs: ZX81 Hypocycloids, TRS-80 Truth, PET Doc, TRS-80 Screen Dump, PET Boxes, Atari Earth.

Volume 3, No 9, 1982
 Benchtest: ICL Personal Computer/Checkout: E40/CP/M data compression utility) Daisywriter

printer, HP 11C & 120 calculators/BBC micro graphics capability/Best of APC's cartoons/ How to use Benchmarks/Logo Program (Microsoft Basic) Computer generated textures/RS232 overview. Part 2/Memory-saving utility for Apple/How Computers Communicate. Part 11: Interrupts and buffers/Programs: System 80 Extended Basic, Apple Trees, ZX81 Alphabetising, PET File Companion, PET German Game.

Volume 3 No 10, 1982
 Benchtests: Hewlett Packard HP-86, National Panasonic JB3000/ Checkout: Sharp PC-1211/UCSD p-System overview. Part 3 (end)/ How to implement 3D graphics on a micro/CP/M-86 vs MS-DOS: Relative merits of these 16-bit operating systems discussed/ Designing your own database/ Monitor for TRS-80/System 80/ File searching method/"Laws of Form" — a novel form of logic/ How Computers Communicate. Part 12 (end)/Benchmarking high level languages/Programs: TRS-80 Cardshuffler, PET Knockout, PET Trains

Volume 3 No 11, 1982
 Benchtests: Hewlett Packard HP75C, Kaypro 10, DEC Rainbow/Programs for the HP41C and Casio fx702p/Algebra checking program/MORE on MS-DOS vs CP/M-86/Predictions in the micro industry/Clock/calendar card for the Apple II. Part 1/Benchmarks summary/ Programs: Apple II Piano Computer, Moon Module (Apple II, correction in Vol 4 No 1), Walls (Atari, correction in Vol 3 No 12).

Volume 4 No 2, 1983
 Benchtests: Sharp PC1251/Database Benchtest: Hi Data/Micros as best friends/A major boost to the standards of 'user friendliness'/Computing can be a health hazard/'Expert Systems' — part two: appraisal of 'intelligent' computers/Networks: Part 1/The Logo Turtle checked-out/Getting the most from the BBC's graphics/Are home computers just a passing fad?/ The Prestige vs The human: micro chess/Programs: Apple Character Plotter, System Tape Copier (TRS-80/System 80),

Volume 4 No. 8, 1983
 Benchtests: Apple Lisa, DOT/ Checkouts: Osborne Executive, Epson FX-80 printer/Consumer Electronics Show Report/Will the Computer be the next dominant species on Earth/Milton Bradley's chess computer that moves its own pieces/Choosing suitable disks for your computer/ Cryptography on a micro/ Warnier Orr structured programming. Part 1/How to use the six function keys on the PC1500/ Programs: ZX81 Least Squares, System 80 Loading tapes from an external cassette player, TRS-80/ System 80 Adventure program, Apple II Pascal menu generation.

Volume 4 No. 9, 1983
 Benchtests: Sord M5/Checkout: Tandy Model 100, Lisawrite/ Screenplay: TI 99/4A games/ Steve Wozniak returns to Apple/ Choosing a home micro/Warnier Orr programming. Part 2/Graph plotting and curve fitting on the BBC Computer/Bemoaning the mechanical teller/Programs: VIC-20 Snake line, ZX81 Surround, Apple II Screenplay, PET Histogram.

Volume 4 No. 10, 1983
 Benchtests: Archives PC/Home Computer Survey — 15 micros selling for less than \$1000 checked out by Steve Withers in an exhaustive market survey/ Checkout: Simons Basic, T/Maker III — office tool for the IBM PC, Digital Research Personal Basic/Computerising Your Business — a light and practical guide/Beginners Guide to Basic Program Conversion/ Clever trick with TI Sprites/ Cocktail program/Warnier Orr programming. Part III/How portable is portable/Programs: Atari No-Trons, TRS-80/System 80 Multi-Maths, Apple Text Maker, VIC 20 Spider.

Volume 4 No. 11, 1983
 Benchtest: Apricot/Checkouts: Atari 600XL, Ashton Tate's Financial Planner, Condor database, Atari Writer/Which Spreadsheet? PerfectCalc/ Profiles: Clive Sinclair, Nolan Bushnell/Set up your own computer learning centre/Basic Converter Chart/Warnier Orr Programming Part 4: Techniques (end)/Programs: PET Wave

Simulation, Apple II Aplist, Microsoft Basic Calendars, TI99/4A Breakout, Commodore Testing Your Fingers, Apple Dotter Puzzle, VIC-20 Starship, Commodore Maths Test.

Volume 4 No. 12, 1983
 Benchtest: TANDY MC-10/ Checkout: Executive 816, Lotus 1-2-3, VisiOn, Gemini 15X Printer/Computerising Your Business: Part 2, Setting up/Sort Trees for beginners/Pinning big on an Epson printer/Bulletin boards/Programs: VIC-20 Robotank, VZ-200 Missile Command, New 'Bee Screen, MicroBee Grooble Grab, Apple French Test Card, TRS-80 Road Rally.

Volume 5 No. 1, 1984
 Benchtest: NEC PC-8201A/ Checkouts: Coleco Adam, Kaypro 10, Atari Paint, Desq/ Micro music — how it's done: Part 1/"Check Digits" — methods of ensuring correct data entry/Building models using surfaces, not lines/Column sort algorithm/Graphics on Tandy's Co Co/Spectrum listing: photofit/Locking Apple Listings/ Programs: Commodore 64 Fast Sprites, IBM PC Sheepdog Trials, VIC 20 Variable List/ Spectrum Lower CLS, Commodore 64 Monitor, Oric City Defense, MicroBee Tunes.

Volume 5 No. 2, 1984
 Benchtest: Workslate, Commodore 720/Checkouts: Visually, Sord's Falc, '64 Vizawrite, Brainstorm/DIY Apple Interface/ TRS-80 Disassembler/Benchmark summary to-date/Basic Program Conversion. Part 2 (Part 1 in Vol4 No. 11)/BBC Music. Part 1/Could speech synthesisers do long term damage to the language?/Programs: TRS-80, Pascal Procedures, PET Maths Maze, BBC Logic Tree, VIC 20 Grid Bike, '64 Heli-bomber, '64 Battlestar Fighter, Apple Bridge Builder.

Volume 5 No. 3, 1984
 Benchtests: IBM PC Junior, Sharp MZ-700/Checkouts: Androbot's Topo, Homeword word processor, TKISolver, Educational Games/Basic Program Conversion. Part 3: Apple II graphics/Atari memory (for patterns of colour and sound) tester/Teach Yourself Assembler.



Part 1/BBC Music, Part 2/View of the future from the author of VisiCalc/Give your program cassettes a spoken index/Programs: Apple Stargo, PET Areas, Spectrum Jackpot, Atari Split-screen, TRS-80 Sound Synthesiser, 3D Bee '64 Sprite Designer.

Volume 5 No. 4, 1984

Benchtests: Macintosh, Spectravideo/Checkouts: IBM Portable PC, Unix, Visiword Plus, Spectravideo/Teach Yourself Assembler, Part 2/Basic Program Conversion, Part 4: TRS-80 and Apple II graphics/Sharp PC1500 game scoring listing/Interview: Bill Gates of Microsoft/Microchess: 4th World Chess Championship results/Inside Atari's research laboratory/Programs: (Microsoft Basic) Inlay Cards, BBC Splash!, VIC 20 Invaders, Commodore 64 Reversi, VZ-200 Moon Lander, '64 Gary the Guitar.

Volume 5 No. 5, 1984

Benchtests: Hewlett Packard 150 Touch Screen, Dick Smith Challenger, Canon X-07/Checkouts: Revelation, Concurrent CP/M, StarBurst and StarIndex, Sendata modem, Commodore SFD 1001 disk drive, Brother EP44 personal typewriter/Basic Program Conversion, Part 5: Atari/Compaction techniques, examples in Commodore Basic/Teach Yourself Assembler, Part 3/Text vs Graphics adventures/Operating Systems, Part 1/Microchess: Superstar vs Constellation/Programs: '64 Plane Attack, Commodore Wordsquare, Atari Flash Simulator, Atari Pseudo-Dos, Sord M5 Charpatt, VIC 20 Ape King, MicroBee Hires Editor, Apple II Oisterads, Bee Label Printer.

Volume 5 No. 6, 1984

Benchtest: Sharp PC5000/Checkouts: Codewriter, Microsoft Word, Dick Smith Cat, Apple ProDos, KnowledgeMan, Autocad/Play Battleships on two Commodore computers/The History of the Keyboard/Teach Yourself Assembler, Part 4/Artificial Intelligence: a report from Japan/Basic Program Conversion, Part 6: Spectrum/Spectrum "wide screen" word processing/Software Copyright: the debate/The dangers of reviewing software/Programs: TRS-80 Compiler, TRS-80 Braille Writer, VIC 20 Deathwall, Basic-86 Marvin, PET 3D O's & X's, Five W Bee.

Volume 5 No. 7, 1984

Benchtest: Epson PX-8/Checkouts: Memotech, Framework, HP Ink Jet Printer, Expert-Ease, Apple's Instant Artist/Teach Yourself Assembler, Part 5/Operating Systems, Part 2/Designing and selling programs, Part 1/Calling routines available in CP/M/The story behind MSX/Basic Program Conversion, Part 7: BBC/Programs: '64 Balloon, Atari Function Keys, BBC Sec'd, MicroBee Slalom, VZ-200 Blockout, '64 Split Screen Graphics, VIC 20 Monster Hunt.

Volume 5 No. 8, 1984

Benchtest: Sinclair QL/Checkouts: Perfect Link, Friday!, KnowledgeMan (Part 2), PlanStar, Commodore 64 Flight Simulator, Constellation, Pick/Modem protocols: XModem/Exploring WordStar/Input and Output on the Atari/\$25,000 competition: Brun's Constant/Teach Yourself Assembler, Part 6/Designing and selling programs, Part 2/Teach Yourself Lisp, Part 1/Diente between DP departments and standalone users — the Information Centre/Programs: VIC Hatchery, BBC RAM Editor, VIC 20 Life Game, Commodore 64 Connect-Four (note correction to this program in Bludners Vol 5 No. 10, 1984), VZ-200 Database, TRS-80 Color Graf Editor, Atari Basic System Reset.

Volume 5 No. 9, 1984

Benchtests: Hewlett Packard 110/Checkouts: Framework vs Symphony, overview, Portable Computers, Jane vs Appletworks, Pick/Profile: Wayne Wilson/Teach Yourself Lisp, Part 2/Logic of assembly language, written in convertible Basic/Teach Yourself Assembler, Part 7/Brainpund: Defence of the Gogotog Bird (this is a really excellent one page article — Ed! Microchess: Cray Blitz vs David Levy/Programs: '64 Defuse, BBC Mindwaves, VIC 20 Gothic and Greek, '64 Brackets (an updated version appears on page 76 of Vol 5 No. 11, 1984), Spectrum File, VIC Star Scramble (note: a correction to this program appears in the Bludners section of Vol 5 No. 10, 1984).

Volume 5 No. 10, 1984

Benchtests: Commodore Plus/4, Osborne Encore/Checkouts: Model 100 disk drive and video interface, Open Access, GSX from Digital Research, Netcomm modem/Is this education software any good: opinion/DIY robotics for the BBC/Combining video and PC output on the one screen/Sorting useful-sized files without a disk/Bubble memory: has it been worth the wait/Teach Yourself Lisp, Part 3/Pirate Bulletin Boards/DIY PC-video connection/How to write great software, Part 1/Programs: Atari Autorun, Commodore 64 Basic Assembler, Apple II Menu, BBC Equation Solver, Commodore Honeypot, Atari Snake, Spectrum Voyager, VZ-200 Mini calc Spreadsheet (improved in Bludners Vol 5 No. 12, 1984), IBM PC Microcomputer Graphics, Animated '64, Spectrum Graphics and sound.

Volume 5 No. 11, 1984

Benchtest: Apricot FI/Checkouts: Olivetti M24, Sperry PC, ITT Xtra, Commodore 16, AAP's microwave news service/The demise of the philosophy of the scholar: opinion/Artificial Intelligence: mind over matter/DIY Micro Music Circuit (to plug into a parallel port)/Computer Musicians/Teach Yourself Lisp, Part 4/Compilers: How they work and how to buy the best/Improving Commodore 64 programming skills/How to write great software, Part 2/Molecular electronics/Programs:

Commodore 64 Superfile, Commodore 64 Mouse Master, '64 Sprite Editor, BBC graphics compiler/interpreter, Spectrum Crib Player, VZ-200 MON-200, Duelling VICs.

Volume 6 No. 1, 1985

Benchtests: ComputerPhone, Data General One/Checkouts: Filevision, Juki 6100 printer/Spreadsheet product overview/Data validation in Microsoft Basic/Teach Yourself Lisp, Part 6/Voice synthesis and recognition as a viable alternative to the keyboard/Programs: Brimstone Part 2, Spectrum Golf, Basic Sort At Input, Commodore 64 Def-keys, Commodore 64 Space Drop, Commodore 64 Raster Interrupts, VZ-200 Sketcher.

Volume 6 No. 2, 1985

Benchtests: North Star Dimension, Digital Research GEM/Checkouts: Microsoft Macintosh Basic 2, WordStar 2000/Preview of new Commodore and Atari machines/Moving up from dBase II to III/Teach Yourself C, Part 2/Data transmission methods/Random number and arithmetic algorithms/Computer controlled lasers/Cray Blitz at the North American Computer Chess Championship/Programs: Spectrum Qix, Atari Disk Sector Editor, BBC Basic Line Profiler, TI/99A Submarine Hunt, Crazy Caverns, Part 1 (Commodore 64).

Volume 6 No. 4, 1985

Benchtests: Epson PX-4/Checkouts: Pascal, Modula 2, Apple MacBasic, Electronic Mail Systems, Electric Desk, Sargon III/Microtex 666 electronic publishing/Spreadsheet warnings/New screen technologies/Searching and sorting techniques/Teach Yourself C, Part 3/Computer jargon explained/Program more quickly and reliably with object-oriented design/Using Basic to write business programs/Programs: Commodore 64 Scroffs Basic, Atari Multi-Mode Text (completed in Vol. 6 No. 6, 1985), BBC Smooth Scroller), BBC Anti-List Utility, Controller, Crazy Caverns Part 2 (Commodore 64).

Volume 6 No. 5, 1985

Benchtests: Commodore PC/Checkouts: Yamaha CX5 MSX music micro, Enable, Smart, Seiko wristwatch micro, Sidekick, Spotlight, Omni-Reader/Do you need a multi-user system?/Online information services/Lasar disks as computer memory/PC-Mainframe links, Part 1/Digital Research Concurrent DOS 286/Teach Yourself C, Part 4/APL computer language/World Microcomputer Chess Championship/Programs: Split MicroBee, VIC-20 Programmable Keys, dBase II Preprocessor, BBC Screen Designer-Input Validation, VZ-200 Micro Type.

Volume 6 No. 6, 1985

Benchtests: Atari 520 ST, Texas Instruments Profit/Checkouts: Brother WP600 printer, Amstrad Microscript, Digital Research Presentation Master, Microsoft Word for the Macintosh/Keeping your PC running smoothly/PC-

Mainframe links, Part 2/Musical possibilities with the MIDI interface/Turbo Pascal/Teach Yourself C, Part 5 (end)/Spreadsheet techniques/Incorporating artificial intelligence into your programs/Data transmission by cellular radio/The fate of Unix/CBBS (for bulletin boards) explained/Programs: Commodore 64 Disk Utility, Spectrum Triplets, Atari Error Message Reporter, BBC Format 40/80, Atari Multi-Mode Text, Amstrad See PC, Tandy Color Darts.

Volume 6 No. 7, 1985

Benchtests: HP Integral PC, Commodore 128/Checkouts: ERA Encryption board, Microsoft File, Skai disk drive (for the Commodore 64), Hi-Tech C vs Aztec C/Speeding up a PC/Macroprogramming with Spell-binder/Random numbers and how to win at Blackjack/Computer incompatibility/Teach Yourself Logo, Part 1/Interfacing an Apple II with a BBC/PC-Mainframe links, Part 3 (end)/Viatiel for the micro user/Edward de Bono on AI/Programs: Commodore 64 Logic Emulator, Spectrum Nine Men's Morris, Atari Yahtzee, BBC Alpha (AI simulator), Commodore 64 Disk Operations (routines for 1541 owners), Apple Turtle, VZ-200 Database.

Volume 6, No. 8, 1985

Benchtests: Epson QX-16, Commodore Amiga/Checkouts: dToolkit, Power Base, Amstrad CPC664, Samna +, McMill 68008 Apple II card/CalcResult for the Commodore 64/DIY 512k upgrade for the Macintosh/Text compression/Electronic mail techniques/Intricacies of problem solving algorithms explored/Are user-friendly interfaces worthwhile/Programs: Commodore 64 Turbo-DOS, Spectrum Speech, Epson HX-Modem, Microsoft Basic Compressor, BBC Spooler, Commodore 64 FKey, '64 Disk File Inspector, Apple II Vandalos.

Volume 6 No. 9, 1985

Benchtests: Kaypro 286i vs Compaq Deskpro 286, Sharp MZ-800/Checkouts: GEM vs Windows vs Topview, Penman plotter, Perfect II Sensible Solution database, Jazz, Magna-biz accounting, Sycoro/Changing from Wordstar to Wordstar 2000/A compiler on a chip promises 1000 fold increase in speed/Computer simulation of real life/Functional programming (next stage from structured

programming/Programming business graphics/Teach Yourself Logo, Part 2/Are processors growing too quickly/Programs: Commodore 64 Nest of Evil, MSX Chas in the Castle, Spectrum Nighthawk, BBC Turtle Graphic, Logo Database.

Volume 6 No. 10, 1985

Benchtests: IBM IX, Amstrad 6128, Morrow Pivot Two, Zenith 171, Ericsson Portable, Kaypro 2000, GridCase, Data General One, Hewlett-Packard 110, Toshiba T1100/Checkouts: Dataflex, Bee Artistic/Programming data dictionaries/Writing your own compiler/Teach Yourself Logo, Part 3/Special feature — Artificial Intelligence: Expert System introduction: Prolog reviewed: Reveal, Tess, Savori, ExpertEase and Trigger reviewed: A guide to companies marketing AI products: Elementary expert PC diagnostic system program listing/Martin Banks on fuzzy logic in AI/Proposed standard for cheaper interfacing/Programs: Atari database, BBC Graphics Utilities Monitor, Memotech MTX database, Spectrum 'Not Another Kong', Commodore 64 Renumber.

Volume 6 No. 11, 1985

Benchtest: Sony SMC-Tii/Checkouts: TIM IV, Excel, Pagemaker-Laserwriter, Viewstore, Personal Consultant, Expert Systems (Expertech Xi, Lightyear, ES/P Advisor)/Buying second-hand micros/Rule induction techniques in programming/The definition of life/Teach Yourself Logo, Part 4/Natural language programming/Spreadsheet techniques/Easiest and cheapest ways to use dial-up databases/Fido links for bulletin boards/Programs: Amstrad Pascal Wall Calendar, Commodore 64 Jiffy Clock, Atari IWDSO, Wizard of Odds (Microsoft Basic), Freddie, BBC Logic Tester, MicroBee Database.

Volume 6 No. 12, 1985

Benchtests: Hewlett-Packard Vectra, Olivetti M24SP, Apricot F10, Amstrad PCW8256, Spectravideo XPress/Checkouts: Apple Hard Disk 20, Homepak, Cornerstone/Reduced Instruction Set Computers/Pascal vs Basic vs Comal/Micro maintenance companies/Encryption of data: the state of the art/Parallel architectures/Teach Yourself Logo, Part 5 (concludes in Feb '86)/Copyright when the author's dead/Programs: Commodore 64 Trace-Walk-Step, Spectrum Spreadsheet, Amstrad Amsquill.

Benchmark roundup

Kester Cranswick reports on a year of 32-bit processors.

Computers are unquestionably getting faster. In the world of the microchip, the quest for speed is still as dominating as ever. Mip (million instructions per second) is part of mainframe specification vocabulary and in the US, IBM is building a computer that will perform one billion instructions per second!

In the micro world, where computers fit on a desk and run things like Lotus 1-2-3 and Zork, we still measure the speed of computers in seconds. Eight Benchmarks, written in Basic, were devised to test the speed at which a micro runs. They are still the only objective means to compare different microcomputers.

Since we started testing computers in May, 1980, we have been running an annual roundup of their Benchmarks. Last year the Sage II topped the list, comfortably ahead of the IBM AT. The fastest portable computer was the Hewlett-Packard HP 110, and the top home machine was the Challenger, even though some might think it more business orientated and give the honours to the Acorn BBC B.

From last year's list, we have deleted 11 machines and added 18, bring the number of contenders up to 61.

For all the advances of the year, nobody has been able to better the Sage II for speed. Just look at those figures, averaging out to 4.47 seconds. The Sage II runs a Motorola MC68000 16 bit processor and a compiled version of Basic. That puts it at odds with other machines using interpreted Basic, but the results are plain to see. For pure number crunching, it is the Speedy Gonzales of the year.

Just three-hundredths of a second slower than the Sage II was the more conventional Hewlett-Packard Vectra, with a figure of 4.50 seconds. It is an advanced IBM AT compatible. In fact, the AT, with an average figure of 7.11 seconds, has been pipped by no less than four new micros, three of them out and out AT clones.

Both Kaypro and Compaq AT-compatibles beat their mentor. Also beating it was the great Commodore hope, the Amiga. This is as much a home as a business micro, so takes the prize

from Challenger in the home (H) category, being over twice as fast. It is a good deal faster than other business micros too. Note that it runs a 68000 processor.

Speed isn't everything though. Benchmarks measure only one aspect of a micro's performance. For crunching numbers, scientific calculations and image manipulation, a fast speed is certainly an asset, but it is not the only criteria on which to base a buying judgment.

For example, the North Star Dimension, a new entry, comes in at number nine. It picked up the Business Hardware award in the inaugural APC awards. Basic speed is a factor, but there is more to a successful business micro than that.

The letter B against a machine indicates that it is aimed at the business market. In the portable category, denoted P in the chart, the HP 110 is still the fastest, averaging out at 10.38 seconds. Not far behind though are two new entries, the HP Integral (11.90sec) and the Sharp PC-7000 (12.10sec). The

Benchmarks

```
100 REM Benchmark 1
110 PRINT "S"
120 FOR K=1 TO 1000
130 NEXT K
140 PRINT "E"
150 END
```

```
100 REM Benchmark 2
110 PRINT "S"
120 K=0
130 K=K+1
140 IF K<1000 THEN 130
150 PRINT "E"
160 END
```

```
100 REM Benchmark 3
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/K*K+K-K
150 IF K<1000 THEN 130
160 PRINT "E"
170 END
```

```
100 REM Benchmark 4
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 K<1000 THEN 130
160 PRINT "E"
170 END
```

```
100 REM Benchmark 5
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 GOSUB 190
160 IF K<1000 THEN 130
170 PRINT "E"
180 END
190 RETURN
```

```
100 REM Benchmark 6
110 PRINT "S"
120 K=0
```

```
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB 220
170 FOR L=1 TO 5
180 NEXTL
190 IF K<1000 THEN 140
200 PRINT "E"
210 END
220 RETURN
```

```
100 REM Benchmark 7
110 PRINT "S"
120 K=0
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB 230
170 FOR L=1 TO 5
180 M(L)=A
190 NEXTL
200 IF K<1000 THEN 140
210 PRINT "E"
```

```
220 END
230 RETURN
```

```
100 REM Benchmark 8
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K 2
150 B=LOG(K)
160 C=SIN(K)
170 IF K<1000 THEN 130
180 PRINT "E"
190 END
```


CAT	Machine	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Average
B	Sage II (p-code)	.50	.70	1.30	1.70	2.10	5.10	6.40	18.00	4.47
B	HP Vectra	0.50	1.50	3.00	3.10	3.30	5.80	9.10	9.60	4.50
B	Compaq Deskpro 286	0.40	1.50	3.10	3.30	3.50	6.10	9.40	9.00	5.62
B/H	Commodore Amiga	0.75	2.07	4.53	4.87	5.60	10.39	7.84	11.33	5.92
B	Kaypro 286i	0.60	2.00	4.20	4.40	4.70	8.40	12.70	12.90	6.23
B	IBM AT	.80	2.20	4.90	5.10	5.60	9.40	15.00	13.90	7.11
B	Olivetti M24	.80	2.50	5.20	5.20	5.70	10.00	15.30	16.60	7.66
B	Xerox 16/8	1.20	3.60	7.40	7.70	8.70	16.00	4.70	24.70	9.25
B	North Star Dimension	0.80	3.10	6.60	6.80	7.40	13.10	20.2	21.6	9.95
P	HP 110	0.65	3.40	6.60	6.80	7.70	14.20	21.80	21.90	10.38
H/B	Challenger	1.10	3.50	7.50	7.60	8.30	14.90	23.20	26.10	11.53
P	HP Integral	1.90	3.50	6.90	7.10	8.80	18.30	27.30	21.90	11.90
P	Sharp PC-7000	1.10	3.80	7.90	8.20	9.00	15.50	24.60	26.70	12.10
B	Apple Macintosh	.24	.65	6.00	6.40	7.10	8.60	15.90	52.30	12.15
B	HP 150	1.40	4.30	8.70	7.50	10.30	18.40	28.10	26.70	13.18
B	TI Professional	1.00	4.20	9.30	9.70	10.50	19.00	29.50	31.00	14.28
P	TI Prolite	1.30	4.40	9.40	9.70	10.60	18.60	29.30	31.50	14.35
H	Acorn BBC B	1.00	3.10	8.20	8.70	9.10	13.90	21.40	51.00	14.55
H	Amstrad CPC-464	1.09	3.28	9.16	9.61	10.20	19.03	30.18	34.20	14.59
B	Amstrad PCW 8256	1.10	3.80	9.90	10.10	11.00	19.10	30.30	33.90	14.90
B	Epson QX-16	1.40	4.70	10.10	10.40	11.40	20.10	31.30	33.10	15.37
B	Commodore PC	1.30	4.80	10.30	10.70	11.70	20.80	32.20	34.20	15.75
B	Sirius 1	1.80	5.30	10.70	11.10	12.90	24.20	37.10	27.90	16.38
B	DSE Multitech	1.50	5.10	10.90	11.30	12.30	22.00	34.10	35.60	16.60
B	Apricot PC	1.60	5.20	10.60	11.00	12.40	22.90	35.40	34.40	16.69
B	Tandy 1000	1.50	5.30	11.30	11.70	12.70	22.80	35.50	37.20	17.25
B	IBM PC (& JX)	1.50	5.20	12.10	12.60	13.60	23.50	37.40	35.00	17.61
B	Apricot F10	1.80	5.70	11.80	12.30	13.70	25.40	39.50	38.30	18.56
P	Data General One	1.6	5.4	12.9	12.3	13.8	25.2	39.5	39.1	18.72
H	Memotech RS128	1.90	5.30	11.70	11.40	13.30	22.60	40.80	43.70	18.84
B	Apricot F1	2.00	6.00	12.20	12.50	14.10	25.80	39.80	38.60	18.88
H	Sinclair QL	2.10	6.40	10.70	10.30	13.20	26.10	61.80	25.80	19.55
B	NEC APC	2.30	2.30	13.70	17.60	17.80	32.00	34.90	37.10	19.7
B	Osborne 01	1.40	4.40	11.70	11.60	12.30	21.90	34.90	61.00	19.9
B	Sharp MZ-800	1.40	3.40	9.20	8.20	9.00	17.60	33.00	82.10	20.36
H	Sharp MZ-700	.40	3.40	9.50	8.60	9.40	17.70	32.70	82.70	20.55
P	Osborne Encore	1.90	6.60	14.20	14.60	15.80	28.30	44.00	47.80	21.65
P	Epson PX-4	2.30	6.00	14.30	14.10	16.70	30.70	47.80	63.50	24.42
B	Apple III	1.70	7.20	13.50	14.50	16.00	27.00	42.50	75.00	24.68
P	Sharp PC-5000	1.98	5.82	15.80	16.90	19.10	33.00	55.40	52.20	25.03
B	Epson QX-10	2.30	6.40	15.80	15.80	16.50	31.90	52.90	65.80	25.93
P	NEC 8201A	2.6	6.7	17.3	17.3	18.5	30.6	46.9	98.00	29.74
H/B	Apple II	1.30	8.50	16.00	17.80	19.10	28.60	44.80	107.00	30.39
H	Commodore Plus/4	2.00	9.80	18.20	18.70	18.80	34.80	55.30	101.10	32.34
P	Epson PX-8	3.00	8.00	19.50	19.00	22.50	40.00	62.50	89.00	32.94
B/H	MicroBee	2.7	10.0	18.1	17.9	20.9	39.4	67.3	95(est)	33.9
B	Sharp MZ-5600	1.50	7.20	19.80	20.20	21.60	32.80	53.80	115.20	34.01
H	Micro-Processor	2.8	11.0	19.5	21.3	25.0	40.2	61.5	110.6	36.5
B/H	Commodore 128	2.0	11.80	22.00	23.30	26.50	42.40	67.30	126.00	40.10
H	Spectra Video SV-328	2.30	5.70	18.20	20.00	20.90	32.80	45.10	235.70	47.59
P	Epson HX-20	2.70	15.30	33.10	32.80	35.30	59.10	100.60	133.30	51.53
H	ZX Spectrum	4.80	8.70	21.10	20.40	24.00	55.30	80.70	253.00	58.5
P	Tandy Model 100	3.50	9.50	26.50	29.50	31.50	43.00	64.00	321.00	66.06
B/H	Canon X-07	3.9	11.5	32.0	35.8	38.1	58.3	78.9	379.6	79.76
P	Sony SMC-T11	6.60	24.30	61.10	61.60	63.50	101.50	149.00	231.20	87.35
P	Casio PB-100	8.00	39.00	82.00	80.00	105.00	160.00	220.00	341.00	129.4
P	Sharp PC1500	15.00	70.00	121.00	122.00	178.00	293.00	383.00	510.00	211.5

BENCHMARKS

Texas Instruments Prolite also proved to be a speedy portable too, putting last year's runner up, the Data General One, back into fifth place.

Little has happened to alter the H, or home computer placings. The only new entries were the already mentioned Amiga and the Commodore 128, and that was hardly a speed star. Eight bit home computers are on their last legs, as users become more discerning and demand greater power for their dollars.

For the business user, the IBM PC is the standard by which others are judged. 16 bits is what is needed in the office. The PC has an average benchmark of 17.61 seconds. We have added four clones just above it, from Epson, Commodore, Dick Smith and Tandy. But, if you want a fast compatible, the Olivetti M24 is still the one to go for. The average Benchmark figure is a breathtaking 7.66 seconds.

At the opposite end of the scale, the tiny Sharp PC1500 is still the slowest machine we have tested, with some benchmarks taking four and a half minutes. The MSX-derived Sony SMC-T11 portable was the slowest new addition. Benchmarks averaged out at 87.35

seconds but it had a pre-production Basic.

What, you may be asking, is a Benchmark? It is a simple Basic program that runs a certain function. The function is repeated 1000 times so the reviewer can get a time on a stopwatch.

BM1 simply runs an empty FOR...NEXT loop. BM2 has a simple, comparative IF...THEN structure. The next five Benchmarks progressively add functions to that structure. BM3 and BM4 introduce a formula, one with constants, one with variables as the operands. BM5 includes a GOSUB routine. BM6 has the micro dimension an array, and BM7 writes data to that array. It is interesting to see how various functions slow down a program.

Benchmark 8 is a test of mathematical and trigonometric functions. Finally, all results are averaged out to give a final Benchmark figure.

Note that very few functions are tested. Nobody has yet laid down similar tests that can be applied to testing graphics, string handling and the like. Standards for testing file handling are evolving, but they are not yet established. But, with the vast differen-

ces in micros, testing anything more than the very simplest functions in a consistent manner is still a dream.

Note too that the language for the tests is Basic. Assembly-coded routines will run much faster, but as there is no uniformity of operating systems, no Benchmarks can be established.

Advocates of other programming languages such as Forth and Pascal are keen to establish Benchmarks for those languages. As yet, none have been standardized, though there are workable proposals around. As Basic is universal on micros, it is unlikely to be displaced by Forth or Pascal, though a series of Logo Benchmarks might certainly get attention.

In the coming year, the promised 32-bit micros should start to make an impact and up the speed ratings a little more. More AT clones will appear with Intel 80286 processors, and the Motorola 68000 will become more used. Couple that with the ingenuity of modern computer designers, and next year's Benchmark roundup could have an entirely different top ten.

END

**NEW 1986 CATALOGUE
INCLUDED IN THIS ISSUE**

Wilbroprint & Computer Supplies

A Division of Wilson Bros. (Printers) Pty. Ltd.
Incorporated in N.S.W.

134 Abercrombie Street, Chippendale
P.O. Box 56, Chippendale, N.S.W. 2008
Telephone: (02) 699 9933

- BANKCARD
- VISACARD
- MASTERCARD

5½" SSDD Memorex Disks
\$23.85 box of 10

5½" DSDD Memorex Disks
\$25.85 box of 10

Personal Shoppers less \$1.85 per box

- Free library case with every 10 disks
- Postage included
- Discount prices for larger quantities
- Prices valid till 30.6.86

**PHONE 008 22 5542 TO PLACE ORDERS FROM ANYWHERE IN
AUSTRALIA FOR THE PRICE OF A LOCAL CALL**

Getting faster

Steve Withers keeps readers up-to-date with new and faster bulletin boards in the festival state.

Things are moving in South Australia! Not content with those fast cars flying round Adelaide, the state hosts the country's fastest bulletin board. Actually, that's not quite true — although The Electronic Oracle has acquired a new multi-speed modem that will work up to 2400 baud full-duplex, there are still a few teething problems to be sorted out.

Other new features dropped into place more smoothly. The Electronic Oracle was the first Australian system to carry the Bytenet Listings. Some months ago, Byte magazine stopped publishing full program listings, making them available electronically instead. That was fine in principle, but it made life difficult for overseas readers — and few would doubt that Byte is the world's premier personal computing magazine.

Fortunately, Byte was prepared to provide the listings on diskette to bulletin boards, and this offer has been taken up by many operators around the world. If other Australian operators would like to carry Bytenet Listings, they may have a message for the system operator of The Electronic Oracle on (08) 260 6686.

The Electronic Oracle allows 10 minute limited access to visitors, but full access is only available to subscribers (\$10 for 3 months, or \$35 per year). To

make it easier to sign up — and less painful — the system now has Bankcard, Mastercard, and Visa facilities. Another first?

Microtex 666

We've often felt that the indexes to the Microtex 666 telesoftware library left a lot to be desired, especially when flipping through pages of old titles in order to reach the new items. Well, things have improved with new alphabetical indexes and a special "what's new" section. It's a good job that these changes have been made, because the library itself continues to grow at a surprising rate.

"Point Reports" is a new section that features up-to-date news items from the computing industry. "Point Reports" are written by Computing Australia staff.

If you're looking for some light relief, a couple of quiz games have popped up in the Games and Gametalk department.

Corrections and Updates

MicroDesign Lab Citadel. (02) 663 0150 and (02) 663 0151. P. Stephen Jolly. 24 hours daily.

Computers Galore IBBS. Permanently closed.

Trash II. (09) 478 1163. 8pm-7am daily. Commodore 64.

Information Wanted

Sydney Public Access RCPM
Software Tools RCPM
Coco-Line
NZ Micro Club RBBS

The above systems have either changed phone numbers, or shut down completely. If anyone can fill us in, we would appreciate it.

We would also be grateful for details of the operating hours of two Queensland systems, ED-RCPM and Hotline.

All details provided in this column are believed to be correct, but we welcome new information. Please mention whether you have first hand knowledge of the systems you tell us about, or are simply passing on information from another source. Viatel users can send messages to Mailbox 063000030, users of RUNX and other systems on ACSnet can mail to stephenw@murdu, and letters may be addressed to Steve Withers, C/- Computer Publications, 77 Glenhuntly Rd, Elwood, Victoria 3184.



Psst!...
**Dealers,
OEMs,
Software
Houses,
PC Users...**



... are you
buying from the
Australian distributors
and multi-user specialists?

CALL US NOW!

archives
Preferred Supplier to the Federal Government

• Melbourne (03) 699 8377
• Sydney (02) 922 3188
• Canberra (062) 476 555

The Multiuser Specialists

Kevin O'Connell is just back from the North American Computer Chess Championship held last October — Here he describes what happened.

The 16th ACM American Computer Chess Championship was played last October in Denver, Colorado. First and second prizes were taken by programs running on special chess hardware — in the case of the first prize-winner, a minicomputer was in overall control of hardware containing 64 custom chips (one per square!), each of which had 15,000 gates. That program, Hitech, played some superb chess and I will give one of its games next month.

Second-placed Bebe had occupied that same position last year and in the previous year's World Computer Championship.

In third place was a program from Intelligent Chess Software (running on an Apple II). It finished ahead of last year's victor and reigning World Computer Champion Cray Blitz which was running on four Crays (a mere \$45,000,000 worth of hardware), but they plan a big comeback next year when they expect to be running on 32 Crays in parallel — if you have a spreadsheet handy you can try calculating the cost of all that hardware: (\$45,000,000/4x32!)

Final scores (note the interesting entry which finished in seventh place — not quite such a big bang as that laboratory's more famous development made when it was tested out in the New Mexico desert) were:

- 1 Hitech (Carnegie-Mellon University, Pittsburgh) 4 out of 4;
- 2 Bebe (SYS-10 Inc, Illinois) 3;
- 3 Intelligent Chess Software 2½;
- 4-6 Cray Blitz (Cray Corp., Birmingham, Alabama), Phoenix (University of Alberta, Edmonton), Chaos (University of Michigan, Ann Arbor) 2;
- 7-9 Lachex (Los Alamos National Laboratory, New Mexico), Spoc (SDI/Cypress Software, San Jose, California — this was the only other micro, running on a PC clone) 1, Ostrich (McGill University, Montreal) 1½;
- 10 Awit (University of Alberta, Edmonton) ½.

In the following game White had a paper advantage — a 6Mbytes program running on an Amdahl 5860 against a 64k program running on an Apple II. It proved to be an interesting game.

White: Chaos. **Black:** Intelligent Chess Software. **Opening:** Gruenfeld Defence.

- | | | |
|---|-------|---------|
| 1 | d2-d4 | Ng 8-f6 |
| 2 | c2-c4 | g7-g6 |

- | | | |
|---|--------|--------|
| 3 | Nb1-c3 | d7-d5 |
| 4 | c4xd5 | Nf6xd5 |
| 5 | e2-e4 | Nd5xc3 |
| 6 | b2xc3 | |

The principal starting position for the Exchange Variation of the Gruenfeld. The title is particularly apt — not only have knights and pawns been exchanged, but Black has given up all the central squares for the opportunity to bring pressure to bear indirectly against White's big pawn centre.

The concept of indirect pressure is a very difficult one for programs to cope with, so in computer chess this line is usually very good for White, as in the game Chaos-Awit, played in the last round of the Denver tournament, which went on 6... c7-c5 7 Bf1-c4 Bf8-g7 8 Ng1-e2 Bc8-g4 (never played here — you will soon see why) 9 Qd1-b3 c5xd4 10 Bc4xf7+ Ke8-f8 11 f2-f3 d4-d3 12 f3xg4 d3xe2 13 Ke1xe2 (not for the sake of the pawn, but for access to the f1 and d1 squares) 13... Qd8-c8 14 Bf7-e6 Qc8xc3 15 Qb3xb7 Qc3-c6 16 Rh1-f1+ Kf8-e8 17 Be6-f7+ Ke8-d8 18 Rf1-d1+ Qc6-d7 19 Bc1-f4 (threatening 20 Qb7-c7 mate) 19... Bg7-d4 20 Rd1xd4 Qd7-d6 21 Rd4xd6+ Nb8-d7 22 Rd6xd7 mate.)

- | | | |
|---|--------|--------|
| 6 | ... | Bf8-g7 |
| 7 | Bf1-c4 | 0-0 |
| 8 | Ng1-e2 | Nb8-c6 |
- (8... c7-c5 first is more usual since it helps to increase the pressure against White's pawn centre.)

(This is very unusual. The normal human plan is to play b7-b6 and put the bishop on b7, increasing the indirect pressure on White's central formation.)

- | | | |
|----|--------|-------|
| 9 | Ra1-b1 | a7-a6 |
| 10 | 0-0 | e7-e6 |
- (This is a bad move, shutting in Black's light-squared bishop and also significantly weakening the f6 square, but Black can get away with it.)

- | | | |
|----|--------|--------|
| 11 | Bc1-a3 | Rf8-e8 |
| 12 | Qd1-a4 | |
- (Now White must watch out for a well-timed b7-b5.)

12... Qd8-h4 (Aggressive, but 12... Bc8-d7 might be better — if 13 Rb1xb7 Nc6xd4, for example, 14 Qa4-a5 Nd4xe2+ 15 Bc4xe2 Bd7-c6 with a great game for Black.)

- | | | |
|----|-------|--------|
| 13 | f2-f3 | Bg7-h6 |
| 14 | f3-f4 | Qh4-g4 |
| 15 | g2-g3 | Ra8-b8 |
- (Thematically following up the previous move by increasing the pressure on the dark squares.)

(The immediate 15... b7-b5 was very interesting but only level after 16 Bc4xb5 a6xb5 17 Qa4xa8 Bc8-d7 18 Qa8-b7 Qg4xe2 19 Qb7xc7 Qe2-e3+ 20 Rf1-f2 Qe3xc3 21 Qc7xd7 Re8-d8 22 Qd7-b7 Rd8-b8, and so on. Now black threatens b7-b5 in earnest.)



Chessboard 1

16... Qa4xc6 (A decision which surprised everybody present. White gives up a small amount of material to weaken Black's position. The weaknesses induced (the doubled and isolated pawns) were scored by Chaos as worth more than the material (approximately one pawn) which it gave up.)

- | | | |
|----|--------|-------|
| 16 | ... | b7xc6 |
| 17 | Rb1xb8 | a6-a5 |

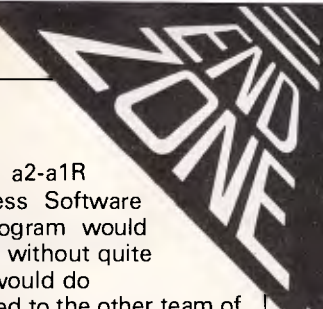
(Black's position is not at all pleasant... for a human, but computers do not suffer from psychological problems when playing difficult positions, especially when they have the psychological boost of some extra material!)

- | | | |
|----|--------|---------|
| 18 | Rf1-b1 | |
| 18 | ... | Qg4-f3 |
| 19 | e4-e5 | Qf3-e3+ |
- (White's knight on e2 is awkwardly placed — but for its problems, Bc4-a6 would be a grave threat.)

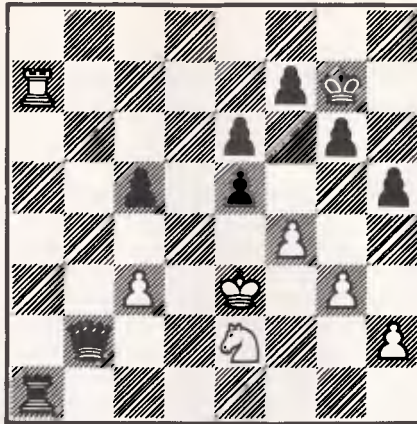
(At the time I was hoping for, but not expecting 19... g6-g5 to prise open more lines to the white king (the idea is to take on f4, play the king to h8 and put the rook on g8) since 20 f4-f5 is not very good for White; for example, 20... e6xf5 21 e5-e6 f7xe6 22 Bc4xe6+ Re8xe6 23 Rb8xc8+ Kg8-g7 24 Rc8xc7+ Kg7-g6 and White is in trouble.)

- | | | |
|----|--------|---------|
| 20 | Kg1-g2 | Qe3-e4+ |
| 21 | Kg2-f2 | Bh6-f8! |

(A very good move, exchanging one of Black's least active pieces for White's most effective one.)



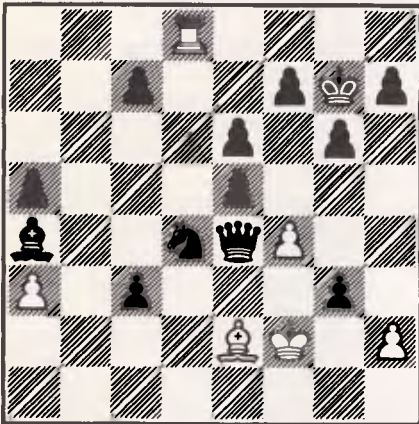
- 22 Ba3xf8 Re8xf8
 (Now that the rook is protected, Black need not fear Rb1-b7 which otherwise could have proved very nasty.)
 23 a2-a3 c6-c5
 (A good move, even were White's d-pawn not pinned against the bishop.)
 24 Rb1-b2 c5xd4
 25 Ne2xd4
 (If 25 c3xd4 then Black plays pawn to c5 again (one of the few occasions when doubled pawns can be positively useful).
 25 ... Bc8-d7
 26 Bc4-e2 Rf8xb8
 27 Rb2xb8+ Kg8-g7
 28 Rb8-d8 Bd7-a4



Chessboard 3

- 46 Ra8-a7 a2-a1R
 Intelligent Chess Software thought their program would play this move, without quite knowing why it would do so. They suggested to the other team of programmers, perhaps tongue-in-cheek, that their program was playing on the likelihood that Chaos would know that it is bad to exchange pieces when behind and was therefore trying to bluff White into moving the rook away so that Black could then win very quickly with Ra1-e1.)
 47 Ra7xa1 Qb2xa1
 48 Ke3-d3 Qa1-h1

END



Chessboard 2

- 29 Be2-f3 Qe4-b1
 (White will inevitably drop a pawn.)
 30 Nd4-e2 Qb1-b2
 31 Rd8-c8 Qb2-b6+
 32 Kf2-g2 Ba4-c6!
 (When ahead, exchange pieces.)
 33 Rc8-d8 Bc6xf3+
 34 Kg2xf3 Qb6-c5?!
 (This is unnecessarily slow — all the strong human players present expected 34 ... Qb6-c6+ 35 Kf3-f2 (35 Kf3-g4 does not bear thinking about in view of 35 ... Qc6-g2 followed by h7-h5 and Qg2xh2 mate) 35 ... Qc6-c5+ and 36 ... Qc5xa3.)
 35 Rd8-c8 h7-h5
 36 Kf3-g2 Qc5-e3
 37 Kg2-f1 Qe3-f3+
 38 Kf1-e1 Qf3-b7
 39 Rc8-d8 c7-c5
 (39 ... Qb7-h1+ is also good — 40 Ke1-d2 Qh1xh2 41 Rd8-d7 h5-h4 42 g3xh4 Qh2xh4 indirectly protecting the c-pawn because of the check on d8 — but this is better.)
 40 Ke1-f2 a5-a4
 (Black has found the right plan and now no more time is wasted.)
 41 Kf2-e3 Qb7-b3
 42 Rd8-d7 Qb3xa3
 43 Rd7-c7 Qa3-b2
 44 Rc7-c8 a4-a3
 45 Rc8-a8 a3-a2

John White presents two games from his chess program, Negaquerg.

Suicide Chess

(see 'Suicide Chess' elsewhere in this issue.)

Given here are two games from John White's Negaquerg program. Game A uses a normal search strategy, while Game B searches up to four ply ahead in response to threats. Both programs have been forced to open with the same book line, although the line is not the best available to black. The depth of search is appended in brackets, a zero denoting an instant Chopper move. The stated search depth does not include further searching of captures (up to five extra ply) or threats (up to four extra ply). Asterisks (*) denote lines played from the book library. Both programs dynamically adjust their seat depth according to the time remaining.

Programs A and B clearly show the difference in nominal depth of search between the two playing styles given the same length of time.

Game A

AUTHOR	NEGAQUERG
1 E2-E4	20secondsper move
2 E4XF5	F7-F5 *
3 F1XB5	B7-B5 *
4 B5XD7	A7-A6 *
5 D2-D4	D8XD7 *
6 D1XD4	D7XD4 (5)
7 D4XG7	C8XF5 (0)
8 G7XE7	F5XC2 (6)
9 A1XB1	C2XB1 (6)
10 C1-H6	E8XE7 (6)
11 G2-G4	G8XH6 (6)
12 H2-H4	H6XG4 (0)
13 E1XF2	G4XF2 (0)
14 B2-B4	E7-F6 (5)
15 B1XB4	F8XB4 (0)
16 B4XB8	H8-G8 (6)
17 G1-H3?	G8XB8 (6)
18 H1XB1	B8-B1 (6)
19 H4XG5	F6-G5 (5)
20 B1XB8	A8-B8 (5)
21 G5XH6	H7-H6 (6)
22 B8-B4	C7-C6 (7)
23 H6-H7	C6-C5 (6)
24 A2-A3	C5XB4 (0)
	B4XA3 (0)

The remainder of the game illustrates the considerable disadvantage to a side which has pawns but no pieces. White has only to mark time.

25 F2-E3	A6-A5 (6)
26 H3-G1	A5-A4 (7)
27 G1-H3	A3-A2 (0)
28 H3-G1	A4-A3 (7)
29 G1-H3	A2-A1 (=Q) (0)
30 H7-H8 (=Q)	A1XH8 (0)
31 E3-E4	H8XH3 (0)
32 E4-E3	H3XE3 (0) and loses.

The total time taken by the program was six minutes 10 seconds, an average of 11.5 seconds per move. There were 11 forced moves (no lookahead) and four book opening moves, so that nearly half of all the moves were instantaneous.

Game B

AUTHOR NEGAQUERG + THREATS

Moves 1-4 as in Game A

5 D2-D4	D7XD4 (3)
6 D1XD4	C8XF5 (0)
7 D4XG7	F5XC2 (3)
8 G7XE7	G8XE7 (3)
9 C1-H6	F8XH6 (3)
10 F2-F4	C2XB1 (3)
11 A1XB1	H6XF4 (0)
12 H2-H4 ???	

Oops! I did not want to open the H file for my rook, but overlooked black's simple riposte. Much better was G1-H3. I have included this game because of the elegance of black's remaining moves — every one of my remaining moves is a forced capture.

13 H4XG5	F4-G5 (3)
14 H1XH7	H8-G8 (3)
15 H7XE7	G8XG5 (0)
16 E7XE8	G5XG2 (4)
17 E8XB8	G2XB2 (5)
18 B8XA8	B2XA2 (6)
19 A8XA6	A2-H2 (6)
20 B1XB2	H2-B2 (6)
21 A6XC6 and loses.	C7-C6 (6)

Total time was three minutes 50 seconds for the program, an average of 11 seconds per move.

NUMBERS COUNT

Mike Mudge looks at two-way numbers — a possible revolutionary approach to arithmetic?

This month's story begins with a paper by John Colson entitled *Negative-affirmative arithmetic*, published in *Philosophical Transactions of the Royal Society*, Vol 34, pp161-174 in 1726. In this paper a new way of counting was proposed which used numbers -4, -3, -2, -1, 0, 1, 2, 3, 4, and 5. (No mention of 6, 7, 8 or 9 to be made). The idea was encouraged by the famous mathematician Augustin-Louis Cauchy in 1840, *Comptes Rendus*, vol 11 pp789-798, and formalised by *J Halcro Johnston* in his book *The Reverse Notation*, Blackie 1938.

Notation. The conventional notation consists of inverting the symbols 1, 2, 3 and 4 to represent -1, -2, -3 and -4. However, not having this facility available here, we shall use %, ½, ¼, and ⅓ respectively.

It is hoped that readers experimenting with two-way numbers on their computers may be able to print the conventional inverted digits in their output; the alternative is to use the *non-standard* notation of this article.

Continuing with the background to this concept, a number of papers by Cedric A B Smith from 1941 to 1974 attempted to expound the advantages of the two-way system and were supported by Dylan Morgan writing under the title *Arithmetic made easy*, *New Scientist*, April 1982; also by the publication as an appendix to *Biomathematics* vol 2, 1969 of *Two-way tables*, including squares, common logarithms, sines and cosines.

The quarterly journal *Colson News*, ISSN 0265-9905 first appeared in 1984 and has now produced seven editions (printed at University College, London and edited by CAB Smith, E Hillman and A Paul). It is appropriate to acknowledge the assistance which this publication has given to the preparation of this article.

Two-way numbers. The sequence of

positive integers now appears thus: 1, 2, 3, 4, 5, 1¼, 1½, 1⅓, 1%, 10, 11, 12, 13, 14, 15, 2¼, 2½, 2⅓, 2%... where ¼ means -4, ½ means -3, ⅓ means -2, % means - For example, the year 1984 is thus written 20¼4, 1985 becomes 20½5 while 1986 is written 20%¼.

It is appropriate to record here that J Halcro Johnston who can be aptly called 'The Father of Modern Two-Way Numbers' died on January 3¼, 20½4 at the age of 1%2, and it would be a fitting tribute if his concept of arithmetic could be implemented in a genuine manner on a digital computer.

Two-way arithmetic. We have the additional operation of inverting each of the digits, noting that 0 is self inverse, as is 5 in our presentation; although closer study of two-way numbers will reveal certain advantages in having available a symbol for -5, conventionally 5 inverted but in our notation it would have to be 1/5.

Subtraction then becomes inversion followed by addition; multiplication is somewhat easier in two-way arithmetic and division is little more than a series of additions. Thus:

$$1 \times \frac{1}{3}\frac{1}{4} = \frac{1}{3}\frac{1}{4} \quad 133234 \quad (4\%1\% = 4\%2\%)$$

$$2 \times \frac{1}{3}\frac{1}{4} = \%32\%\frac{1}{4}43 \quad 43 \times \frac{1}{3}\frac{1}{4} = \%0\frac{1}{2}\frac{1}{3}2$$

$$4 \times \frac{1}{3}\frac{1}{4} = \%¼4345 \quad 4345 \times \frac{1}{3}\frac{1}{4} = \frac{1}{2}30 \quad 1\frac{1}{4}3 \frac{1}{3}\frac{1}{4} \quad 54 \quad 34 \quad \%½$$

$$\text{Compare with } 133234/34 = 3918 \text{ remainder } 22$$

Problem A. Construct a computer program which will convert both integers and real numbers expressed as decimals from one-way to two-way notation and vice-versa.

$$\text{Check. } \pi = 3.14159265 \dots = 3.142¼\%3\frac{1}{3}1/5\dots$$

$$\sqrt{3} = 1.7320508 \dots = \dots = 2.\frac{1}{3}3211/51\dots$$

Problem B. Construct subroutines for carrying out genuine two-way arithmetic (not simply converting to one-way, carry-

ing out the arithmetic and then re-converting). For example, $1\frac{1}{2}\frac{1}{2}11\%^3 = 5\frac{1}{2}\frac{1}{3}1/54425\%45\%03\%$ cf $78109^3 = 476544249449029$.

Problem C. Consider the decimal expansion of 1/n in two-way arithmetic, case:

- (i) the expansion is finite,
- (ii) the expansion is alternating — for example, $1/1\frac{1}{3} = .143\%\frac{1}{4}\frac{1}{3}143\%\frac{1}{4}\frac{1}{3}\dots$, $1/13 = 1\frac{1}{2}\frac{1}{3}\%231\frac{1}{2}\%23\dots$; and
- (iii) the expansion is recurring and non-alternating.

Use a computer program to classify 1/n under types (i), (ii) or (iii) for a large range of values of n. What can be concluded?

Readers are invited to submit the results of their investigations into the use of two-way numbers on a computer to: Mike Mudge, C/- APC, 2nd Floor, 215 Clarence St, Sydney 2000.

Submissions, which must reach me by 1 April 1986, will be judged using suitably vague criteria. A prize will be awarded for the best entry received.

Please note that submissions can only be returned if a suitable stamped addressed envelope is provided.

The Numeri Idonei — August review

This month's prizewinner, Gordon Mills, who 'had some fun with this problem', used an Apple II with Applesoft Basic. He correctly modified the problem as posed by the addition of the condition that 'n' can also be a power of any prime or twice the power of any prime. His two-stage sieve process yielded all the Numeri Idonei and lead to the conclusion that the chance of finding a NI greater than 10000 is extremely small; although it cannot be ruled out.

END

BLUDNERS

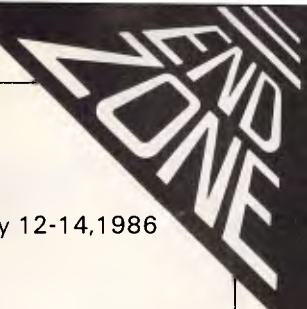
The ciphered text in Fig 6a of 'The Hidden Meaning' (page 122, December 1985) is incorrect. It should read: EEGWEINTMTOUTVNOEHKULYOB-LYRA which decodes as: TELL ME EVERYTHING YOU KNOW ABOUT

The article 'On the Mend', (page 88, December 1985) contained a reference to Hills Computer Service charging a casual rate of \$80 per hour. This rate is incorrect, and is actually \$48 per hour.

END



DIARY DATA



Hobart	Primaus V Contact: Ken Peters, PO Box 282, Lindfield, NSW 2070. (02) 957 3144 or (02) 957 5102	February 12-14, 1986
Melbourne	Finance '86 Contact: Publicity Department, BPI Exhibitions Pty Ltd, 162 Goulburn St, Darlinghurst, NSW, 2010. (02) 266 9799	February 18-21, 1986
Japan	Comdex in Japan '86 Contact: Comdex in Japan Executive Committee, Kashiwabara Bldg, 2/F1, 1-3-3 Kyobashi, Chuo-ku, Tokyo 104, Japan (03) 271 0246	March 3-6, 1986
Sydney	PC86 Conference Contact: ACS, NSW (02) 233 7677	March 12-14, 1986
Sydney	6th Australian Personal Computer Show Contact: Ms F Michael, Australian Exhibition Services Pty Ltd, (03) 267 4500	March 12-15, 1986
London	Info '86 Contact: BED Exhibitions Ltd, 44 Wallington Square, Wallington, Surrey, England SM6 8RG	March 24-27, 1986
Houston, Texas	OAC '86 Contact: OAC '86, C/o AFIPS, 1899 Preston White Drive, Reston, Virginia 22091, US (703) 620 8926	March 24-26, 1986
Melbourne	MacWorld '86 Contact: (02) 439 5133	April 16-19, 1986

LAZING AROUND

Brain-teasers from JJ Clessa

Quickie

If the earth were a perfect sphere and a steel band could be placed around it, how much extra length would be needed to ensure that the band was raised 6cm from the ground all the way round?

Prize puzzle

Short and sweet this month — and not too hard. Can you make a fraction, using all the 10 digits 0-9, which has a value of 9 exactly?

Answers on postcards please, or backs of envelopes, to reach us not later than 20 February 1986.

November prize puzzle

Obviously the November prize puzzle was much harder than usual. About 35 entries were received for this problem — and only 32 of them contained the correct solution.

The winning entry — chosen at random from the pile — came from Ross Henderson of Magill, SA.

Congratulations to you, Mr Henderson — your prize is on its way.

The winning solution is as shown.

2	3	5		1
	1	0	7	6
2		1		3
1	1	4	1	
4		4	5	5

USER GROUPS INDEX

Below is a list of updates and additions to the full User Group Index published in the January issue of APC. The next full listing will appear in the May issue of APC.

NEW SOUTH WALES

Dapto BBC User Group or DBUG is a recently formed user group for BBC users. The club meets at 7pm on the last Wednesday of each month at 3/74 Princess Highway, Dapto NSW. For further information write to: DBUG, PO Box 447, Dapto NSW 2530.

The Blue Mountains Computer Club has changed its name to Blue Mountains Homebrew Computer Club. The club is now specialising in support of home-made and DIY computer systems, including the OZI Rabble. The club also intends to support 68000 based systems, including the Atari 520ST, Commodore Amiga and the Sage/Stride. Meetings are

held at members' homes and interested parties should contact the club for details. Write to: Blue Mountains Homebrew Computer Club, Eric Lindsay, 6 Hillcrest Avenue, Faulconbridge NSW 2776.

Sega owners wanting to contact the Sege User Group should call (02) 831 1150

VICTORIA

The Essendon Commodore 64 User Group has recently been formed. The first meeting will be held on March 1, 12pm at Bus Stop Computers, 1029 Mt Alexander Road, Essendon. For more information contact George Strathoulis (03) 337 4159 or write to 8 Byron Avenue, East Keilor Vic 3036.

QUEENSLAND

A Memotech Computer User Group has been formed on the Sunshine Coast, Qld. Interested parties should write to: Memotech User Group, PO Box 497, Maroochydore Qld 4558.

A new club, the NEC PC-8000 User Group meets on the second Friday of each month at the Old Town Hall, South Brisbane. For further information write to: NEC PC-8000 User Group, C/- David M Clark, 18 Provence Street, MacGregor Qld 4109.

An Australian Postal Institute Computer User Group has been formed in Brisbane. Meetings are held on the first Monday of each month, 6.15pm at 14th Floor, AAMI

Building, 97 Creek Street, Brisbane. For more information contact Steve Devine (07) 835 7044 or Keith Atkinson (07) 835 8033.

For information about the Sega User Group in Queensland, contact Keith Zuch (07) 288 3115 or Robert Horkings (07) 52 5603.

SOUTH AUSTRALIA

For information regarding the Adelaide Sega User Group, contact Jan Jacobsen (08) 382 7967 or Jamie Anderson (08) 263 5020.

WESTERN AUSTRALIA

For details about the Sega User Group in Western Australia, contact John McLennan (09) 342 5905.



**GAULFIELD
TYPEWRITER
SERVICE PTY. LTD.**

25 YEARS 1960-1985

For Commodore Computer Owners

The BROTHER HR10C Personal Daisy Wheel Printer is Interfaced for the following: — COMMODORE 64, COMMODORE 16, COMMODORE PLUS 4 and COMMODORE VIC 20. (The Brother HR10 is also available in a choice of either CENTRONICS Parallel or RS-232C interfacing).

Meet the BROTHER M1509 High-speed Dot Matrix Printer. This new printer is not only very fast and very quiet, it's also very inexpensive. 180cps and 136 columns it will out-value and out-page any rival. And because of its extremely low noise level it will fit peacefully into any office environment.

For further information contact:—

KEN FORSHAW
(Caulfield Computers)
874 Glenhuntly Road, Caulfield South, Vic.
Telephone 528 4555

**TANDY
ELECTRONICS
DEALER**

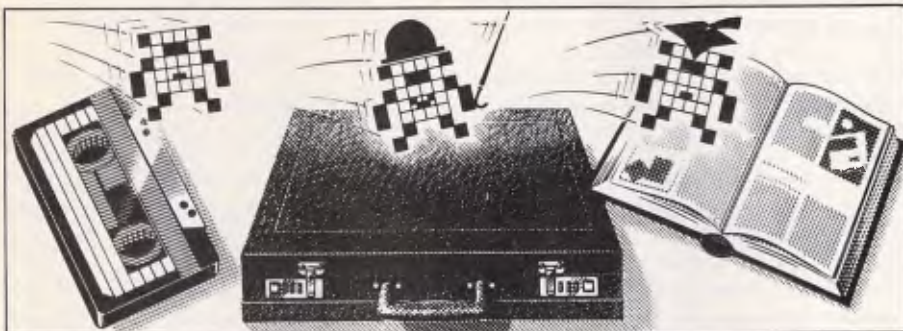
**BIG
DISCOUNTS ON
ALL TANDY
COMPUTERS AND
ACCESSORIES**

Including Model-1000 IBM Compatible

Free delivery throughout Australia.
90 day Warranty
Bankcard & cheque orders accepted.

Bayne & Trembath
3 Boneo Rd., Rosebud, Vic 3940
Ph: (059) 86-8288, A/H (059) 85-4947
(TANDY DEALER 9320)

PROGRAMS



Owen Linderholm selects the best of readers' programs. For details on submitting your own, see the end of this section.

Heading up this month's offerings is a superb program for the Spectrum by Phillip Wade. It allows a Spectrum with an Interface 1 to be hooked up to almost any modem in order to communicate with all types of bulletin board and information retrieval systems. The program overcomes the lack of a UART (Universal Asynchronous Receiver/Transmitter) chip, and is more flexible and powerful than most commercial communications software for the Spectrum — and it's free!

Commodore 64 users can type in an editing program that allows bi-directional scrolling of listings and auto-inserting. It can be combined with the trace/step/walk utility published in APC, December, 1985.

The Amstrad program promised last month, which mysteriously failed to appear, is included: it's a drawing pro-

gram with features such as colour-filling, airbrushes, line drawing and circles.

And finally, Apple Pascal programmers can now PEEK and POKE among other things with some helpful utilities.



Games



Scientific/mathematic



Business



Toolkit/utilities



Educational/Computer Aided Learning



Spectrum Communicator

by Phillip Wade

This program enables a 48k Spectrum with an Interface 1 to act as an ASCII terminal to other computers via the RS232 socket. It will work at up to 1200 baud full duplex, including split baud rates, and can be used with a modem for contacting bulletin boards, and so on. The program will not work with Viatel and Microtex as the Spectrum can't reproduce the Videotex character set.

If a modem is used, you will need one which can be connected to the Spectrum's RS232 socket. If you can't obtain one with a suitable plug, it's probably best to get one to plug into the BBC's RS423 port and then change the plug yourself. The necessary plugs and cables can be obtained from electronics shops.

Another alternative is to connect to a standard RS232 socket (25-pin D plugs). The correspondence between the two sockets for the Spectrum RS232 and BBC R423 is shown in Fig 1. When connecting to other plugs, use the same pins on the Spectrum nine-pin D plug and refer to the modem manual to connect these to the pins corresponding to the equivalents for the BBC.

If you have a modem that can be controlled by software, you will need to write this software yourself, and remember to connect the Spectrum's CTS line to the modem's RTS. Generally, it is safer and easier to use a modem controlled by switches and handle it manually.

The program stores a copy of the

SOFTWARE SPECIALS

DBASE III	\$795
SUPERCALC 3	\$495
LOTUS 123	\$695
WORDSTAR 2000	\$495
SYMPHONY	\$885
FRAMEWORK	\$875
SAMNA III	\$720
MULTIPLAN	\$325
DBASE II	\$575
WORDPERFECT	\$550
MILESTONE	\$265
OPEN ACCESS	\$785
WORDSTAR PROF.	\$530
SMARTKEY	\$ 65
KNOWLEDGEMAN	\$695
SPELLBINDER	\$610
WORD W/MOUSE	\$665
MULTIMATE	\$565
INTEL ABOVE BOARD	\$710

APPLE SOFTWARE & HARDWARE 65K/80 COL & PSEUDO DRIVE FOR APPLE IIe	\$135.00
FLIGHT SIMULATOR	\$ 79.00

Best Prices on over 200 lines of Quality Business Software for IBM, IBM Compatibles, Apple & some other computers.

BANKCARD & MASTERCARD ACCEPTED
Prices include sales tax.
FREE DELIVERY AUSTRALIA-WIDE.

THE SOFTWARE SPECIALISTS

2/124 O'Brien St, Bondi 2026
(02) 30 8005

FMS 'C'

Tools for the Professional

Fortrix 'C'.....	\$1790
Fortran to 'C' Translator	
Bastoc.....	\$885
Basic to 'C' Translator	
Basic C.....	\$309
C source functions which simulate BASIC	
Lattice-Window.....	\$550
Simple to use multiple full windows for IBM-PC	
Lattice db-C.....	\$338
ISAM library with DBASE II or III file compatibility	
Lattice LMK (UNIX make).....	\$416
Track dependencies. Builds batch files automatically	
C Cross Reference Generator.....	\$176
Symbol listings and line references	
BTRIEVE for PC DOS.....	\$467
B-Tree subsystem	
PHACT.....	\$475
Portable B-Tree subsystem	
MSD C Debugger for PC DOS.....	\$392
Source level C debugger	
PFINISH.....	\$523
Execution timing analysis	
PFIX for PC/MS-DOS.....	\$384
Multi window debugger	
PFIX Plus.....	\$716
Symbolic version	

Update your early Microsoft/
Lattice C for \$250.00.

Source code available for many products.

FREE C CATALOGUE

Available exclusively in Australia from:

FAGAN
MICROPROCESSOR SYSTEMS
95 Canterbury Road, Middle Park, Vic. 3206
Tel: (03) 699 9899 Telex: AA31604

PROGRAMS

online interaction in a log file so that it can be viewed again later. It is also possible to print, save and load a log file. This file can hold up to 22,500 characters, and the amount of characters used up at any time is shown below the main menu.

Another option from the menu allows you to reset the protocol used to one of the common protocols used by bulletin boards, or to define all the settings individually. One of the settings allows control characters to be displayed explicitly on the screen. They will appear as an up-arrow followed by one of @,A,B,...,Z,[,/], (^), _ , (£) for the control codes 0,1,...,31,127 respectively. These can also be generated for transmission by typing EMODE followed by the correct letter. Type EMODE again to revert to normal.

The following keys have special functions:

CAPS SHIFT 1	— returns to main menu
" "	2 — toggles caps lock
" "	3 — sends Xoff (CHR\$ 19) to remote computer
" "	4 — sends Xon (CHR\$ 17) to remote computer
" "	5 — sends backspace (CHR\$ 8) to remote computer
" "	6 — sends linefeed (CHR\$ 10) to remote computer
" "	7 — sends cursor up (CHR\$ 11) to remote computer

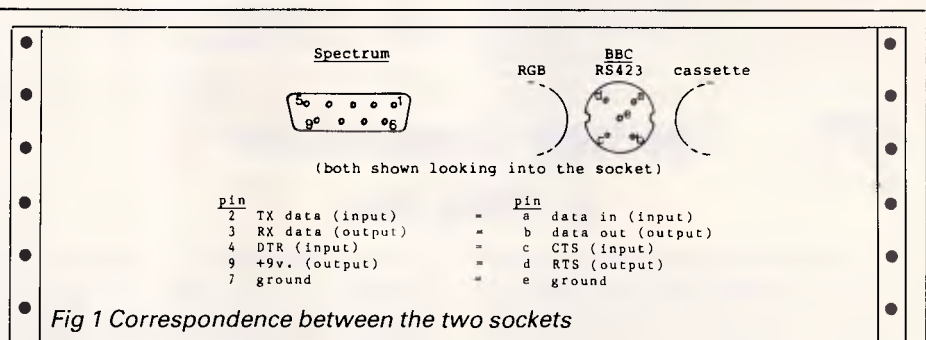
" "	8 — sends cursor down (CHR\$ 9) to remote computer
" "	9 — prints a copy of the screen to ZX printer
" "	0 — sends delete (CHR\$ 127) to remote computer

You should remember that the program only simulates full duplex operation using half duplex, which effectively means that the computer can't really send and receive at the same time, and only pretends to do so by switching between sending and receiving very quickly.

It is possible that arriving characters could be missed or garbled if you are typing when they arrive, but this shouldn't be of too much inconvenience as it is difficult to type quickly on the Spectrum. Just remember not to type ahead by anticipating questions and typing the answers too early.

To use the program, type in the first of the listings and save it using SAVE "sc" LINE 30, then type in the second program and save it to a different tape. This program should then be run, and when it finishes it will generate code. Save it to tape (it should be saved after the first program on the first tape); this tape then holds the working version of the program. To put the program on microdrive, alter the aforementioned SAVE instruction, plus line 50 of the first program and line 110 of the second program.

In the listing, the close-bracket character in lines such as 390, 470, 500 and 510 should be typed in as the # (hash) character.



```

10 GO TO 80
20 REM *****
30 REM enter program here after loading
40 REM subsequently RUN from start
50 CLEAR 32938: LOAD "sc"CODE
60 POKE 63817,170: POKE 63818,128: POKE 63833,228: POKE 63834,87: POKE 63847,2
55
70 REM *****
80 REM main program loop
90 DIM m$(64): CLS
100 PRINT AT 0,0;"Main menu:'AT 0,0; OVER 1;"-----"
110 PRINT AT 3,0;"1. Go on-line (new log file)"
120 PRINT AT 5,0;"2. Go on-line (append log file)"
130 PRINT AT 7,0;"3. Display log file"
140 PRINT AT 9,0;"4. Print log file"
150 PRINT AT 11,0;"5. Save log file"
160 PRINT AT 13,0;"6. Reload log file"
170 PRINT AT 15,0;"7. Reset protocol"
180 PRINT AT 17,0;"8. Into Basic"
190 LET startlf=32939: LET endlf=PEEK 63817+256*PEEK 63818

```


PROGRAMS

```

200 PRINT AT 21,0;"Log file: ";endlf-startlf+1;"/22500 bytes used"
210 PAUSE 0: LET k$=INKEY$: IF k$<"1" OR k$>"9" THEN GO TO 210
220 IF k$="3" AND k$<"5" AND endlf=startlf-1 THEN LET m$="No log file exists"
": GO SUB 880: GO TO 210
230 CLS
240 IF k$="1" OR k$="2" THEN GO TO 320
250 IF k$="3" THEN GO TO 370
260 IF k$="4" THEN GO TO 420
270 IF k$="5" THEN GO TO 560
280 IF k$="6" THEN GO TO 680
290 IF k$="7" THEN GO TO 720
300 STOP
310 REM *****
320 REM go on-line
330*POKE 63B16,VAL k$
340 RANDOMIZE USR 63631
350 GO TO 80
360 REM *****
370 REM display log file
380 POKE 63635,2: RANDMIZE USR 63634: REM outputs the log file to stream 2
390 PRINT 1;"Press any key to return to main menu.": PAUSE 0
400 GO TO 80
410 REM *****
420 REM print log file
430 PRINT AT 0,0;"Print log file";AT 0,0; OVER 1;"-----"
440 PRINT AT 3,0;"1. ZX printer"
450 PRINT AT 5,0;"2. RS232 printer"
460 PAUSE 0: LET k$=INKEY$: IF k$<"1" OR k$>"2" THEN GO TO 460
470 CLS : CLEAR )
480 IF k$="1" THEN GO TO 520
490 INPUT "Supply baud rate for printer: ";baud
500 FORMAT "t";baud: OPEN )3;"t"
510 PRINT 1;"Connect printer to RS232 socket,and press any key.": PAUSE 0: CLS

520 POKE 63635,3: RANDOMIZE USR 63634: REM outputs the log file to stream 3
530 IF k$="2" THEN CLOSE )3: PRINT )1;"Reconnect modem to RS232 socket,and pre
ss any key.": PAUSE 0
540 GO TO 80
550 REM *****
560 REM save log file
570 PRINT AT 0,0;"Save log file";AT 0,0; OVER 1;"-----"
580 LET f$="To": GO SUB 770
590 IF k$="2" THEN PRINT )1;"Insert cartridge in drive 1, andpress any key.":
PAUSE 0: CLS : SAVE *m";1;f$CODE startlf,endlf-startlf+1: VERIFY *m";1;f$CODE
: GO TO 80
600 SAVE f$CODE startlf,endlf-startlf+1
610 PRINT )1;"Press V to verify, any other keyto continue."
620 PAUSE 0: LET k$=INKEY$: CLS
630 IF k$<"V" AND k$>"v" THEN GO TO 80
640 PRINT )1;"Reconnect EAR lead and play tape"
650 VERIFY f$CODE
660 GO TO 80
670 REM *****
680 REM reload log file
690 PRINT AT 0,0;"Reload log file";AT 0,0; OVER 1;"-----"
700 LET f$="From": GO SUB 770
710 RANDOMIZE USR 63777: REM clears log file area
720 IF k$="2" THEN PRINT )1;"Insert cartridge in drive 1, andpress any key.":
PAUSE 0: CLS : LOAD *m";1;f$CODE startlf,22500: GO TO 740
730 PRINT )1;"Start tape.": LOAD f$CODE startlf,22500
740 RANDOMIZE USR 63795: REM sets address of end of log file
750 GO TO 80
760 REM *****
770 REM routine to enquire tape or m/d and get file name
780 PRINT AT 3,0;"1. ";f$;" tape"
790 PRINT AT 5,0;"2. ";f$;" microdrive"
800 PAUSE 0: LET k$=INKEY$: IF k$<"1" OR k$>"2" THEN GO TO 800
810 CLS
820 INPUT "Supply filename: "; LINE f$
830 IF LEN f$=0 THEN LET m$="Filename must be given": GO SUB 880: GO TO 820
840 IF LEN f$>10 THEN LET m$="Filename too long": GO SUB 880: GO TO 820
850 CLS
860 RETURN
870 REM *****
880 REM routine to output an error message
890 PRINT AT 20,0; INVERSE 1;m$: BEEP 1,0
900 RETURN
910 REM *****
920 REM reset protocol
930 PRINT AT 0,0;"Reset protocol";AT 0,0; OVER 1;"-----"
940 PRINT AT 3,0;"1. 300/300 baud, no parity, 1 stop bit, remote echo"
950 PRINT AT 6,0;"2. 300/300 baud, even parity, 1 stop bit, remote echo"
960 PRINT AT 9,0;"3. 1200/75 baud, even parity, 1 stop bit, remote echo"
970 PRINT AT 12,0;"4. Other"
980 PAUSE 0: LET k$=INKEY$: IF k$<"1" OR k$>"4" THEN GO TO 980
990 CLS
1000 IF k$="4" THEN GO TO 1100
1010 IF k$="1" THEN LET inbaud=300: LET outbaud=300: LET parity=2
1020 IF k$="2" THEN LET inbaud=300: LET outbaud=300: LET parity=0
1030 IF k$="3" THEN LET inbaud=1200: LET outbaud=75: LET parity=0
1040 POKE 63B20,inbaud-256*INT (inbaud/256): POKE 63B21,INT (inbaud/256)
1050 POKE 63B22,outbaud-256*INT (outbaud/256): POKE 63B23,INT (outbaud/256)
1060 POKE 63B26,parity
1070 POKE 63B27,2
1080 POKE 63B2B,0
1090 GO TO 80
1100 PRINT "Baud rate for input""Baud rate for output""Parity""Stop bits""
""Echo""Insert LF when CR recd""Insert LF when CR sent""Show control chara
cters"
1110 LET restore=1510: LET address=63B1B
1120 FOR n=0 TO 14 STEP 2
1130 GO SUB 1270
1140 PRINT AT n,26;v$
1150 IF n>0 AND n<10 THEN LET restore=restore+10
1160 NEXT n
1170 PRINT AT 19,0;"Press "; INVERSE 1;"SPACE"; INVERSE 0;" to toggle setting"
1180 PRINT AT 21,0;"Press "; INVERSE 1;"ENTER"; INVERSE 0;" when set"
1190 LET restore=1510: LET address=63B1B

```

FMS

Tools for Professionals

Lattice C..... \$770

The 16-bit C Compiler used by the experts. Early version sold as Microsoft C. Version 2.14 includes automatic sensing of the presence of 8087 chip, Unix-compatible maths functions, and more.

Lifeboat's Run \$309.00

C Interpreter. Perfect for learning or teaching C and debugging C code. Operates like Basic. 100 common functions built in.

Halo \$392

IBM PC Colour Graphics routines: a complete library of graphics primitives for Fortran, Pascal, Lattice C, Basic Compiler, Basic Interpreter, or Assembler. Halo supports the IBM PC Graphics card, the Hercules Card, some other graphics cards, mice and printers. (Price quoted covers one language/card combination.)

Panel \$641

A powerful and flexible tool for designing and editing data-entry screens and keyboards. It generates program code in your favourite language for each screen.

PLink-86 \$716

A two-pass linkage editor allowing overlays in C, FORTRAN, PL/1, PASCAL, COBOL and Assembler. Define overlays at link time. PLink is available for CP/M-80, CP/M-86 and MS-DOS.

The Greenleaf C Functions \$351

This library of functions has its main strength in DOS, string, RS232, color text, and printer functions for the IBM PC. Learn the complexities of C from the examples and source code supplied.

ES/P \$467

The Entry System for Programs is the new, third generation program editor that enables programmers to write 50% faster and 100% better. Includes on-line syntax checking, formatting, structure manipulation, and more. Available now for Lattice C.

ASCOM \$384

Asynchronous Communications Control Program available configured for over 80 different 8 and 16 bit micros.

Available exclusively in Australia from:

FAGAN
MICROPROCESSOR SYSTEMS
95 Canterbury Road, Middle Park, 3206
Tel: (03) 699 9899 Telex: AA31604

DOT MATRIX PRINTERS

Quality Japanese manufacture

Epson code compatible
Dot addressable graphics
4K Ram optional

IBM PC graphics compatible

10 inch 100 CPS \$369
15 inch 130 CPS \$649

Prices include sales tax

One Megabyte memory for

Kaypro Osborne Morrow

SWP's Co-Power Plus gives
you MS DOS with up to
124 KB Ram \$1200 inc tax
Co-Power 88 256K. \$950 inc tax

Project Management Software

Project 6 \$450

- * Critical path/pert
- * Sub projects can be related
- * Up to 256 activities per sub project
- * Resourcing and costing
- * Activity lead lags

Local Area Networking

TRANSNET

for IBM PC/AT and compatibles

Workstations can use full
IBM PC graphics across network

Transnet is completely user
compatible and simple and
transparent to use

Installation requires only twisted
pair cable

\$725 per PC plus installation

Micro EDP & Hardware

9A/I Leura Avenue
Claremont WA 6010
9-3845511 Telex 96140

```

1200 FOR n=0 TO 14 STEP 2
1210   80 SUB 1270
1220   60 SUB 1370
1230   IF n>0 AND n<10 THEN LET restore=restore+10
1240 NEXT n
1250 GO TO 80
1260 REM *****
1270 REM routine to find previous value of one protocol setting
1280 RESTORE restore
1290 READ inc,bytes
1300 LET address=address+inc
1310 READ v$,v
1320 IF v$="end" THEN RESTORE restore: READ inc,bytes,v$,v: RETURN
1330 IF bytes=1 AND PEEK address=v THEN RETURN
1340 IF bytes=2 AND PEEK address=v-256*INT (v/256) AND PEEK (address+1)=INT (v/256) THEN RETURN
1350 GO TO 1310
1360 REM *****
1370 REM routine to set new value for one protocol setting
1380 PRINT AT n,26;"          ";AT n,26; FLASH 1;v$
1390 PAUSE 0
1400 IF INKEY$=CHR$ 13 THEN GO TO 1450
1410 IF INKEY$<>CHR$ 32 THEN GO TO 1390
1420 READ v$,v
1430 IF v$="end" THEN RESTORE restore: READ inc,bytes,v$,v
1440 GO TO 1380
1450 PRINT AT n,26;v$
1460 IF bytes=1 THEN POKE address,v: RETURN
1470 POKE address,v-256*INT (v/256): POKE address+1,INT (v/256)
1480 RETURN
1490 REM *****
1500 REM data for protocol settings
1510 DATA 2,2,"50",50,"75",75,"110",110,"134",134,"150",150,"200",200,"300",300,
"600",600,"1200",1200,"end",0
1520 DATA 4,1,"even",0,"odd",1,"none",2,"end",0
1530 DATA 1,1,"1",2,"1.5",3,"2",4,"end",0
1540 DATA 1,1,"remote",0,"local",1,"end",0
1550 DATA 1,1,"no",0,"yes",1,"end",0

10 CLEAR 63630
20 LET byte=63631
30 FOR n=1000 TO 2180 STEP 10
40 LET total=0
50 FOR p=1 TO 16
60 READ data: POKE byte,data
70 LET total=total+data: LET byte=byte+1
80 NEXT p
90 READ data: IF total<>data THEN PRINT "Mistake in line "in$".","Correct pro
gram and run again.": STOP
100 NEXT n
110 SAVE "sc"CODE 63631,1890
1000 DATA 195,113,249,62,255,205,1,22,42,73,249,237,91,89,249,122,2254
1010 DATA 179,40,1,35,58,12,254,119,17,171,128,213,1,255,255,197,1935
1020 DATA 3,26,19,230,127,254,32,56,7,254,127,40,3,3,24,241,1446
1030 DATA 33,12,254,190,40,11,35,35,190,40,40,35,190,40,36,24,1205
1040 DATA 224,225,124,165,60,40,10,68,77,225,205,10,249,84,93,24,1883
1050 DATA 202,225,213,205,10,249,62,13,215,209,42,73,249,183,237,82,2469
1060 DATA 216,24,184,225,120,177,40,16,11,120,177,40,11,237,66,48,1712
1070 DATA 4,9,229,24,172,197,24,169,225,24,160,120,177,200,126,35,1895
1080 DATA 230,127,254,32,56,245,254,127,40,241,11,197,229,215,225,193,2676
1090 DATA 24,233,33,170,128,34,73,249,35,17,172,128,1,227,87,54,1665
1100 DATA 0,237,176,201,33,142,216,1,228,87,62,0,237,169,32,4,1825
1110 DATA 234,59,249,43,35,34,73,249,201,1,170,128,1,44,1,44,1566
1120 DATA 1,0,1,2,0,0,0,0,0,1,228,87,0,0,0,0,322
1130 DATA 0,0,0,0,0,0,0,0,0,255,0,0,0,0,0,0,0,255
1140 DATA 0,0,205,172,249,205,138,249,205,237,250,220,44,252,205,242,2873
1150 DATA 252,42,100,249,124,181,196,185,253,24,234,58,80,249,183,200,2610
1160 DATA 42,100,249,17,170,2,237,82,56,11,237,82,216,62,238,50,1851
1170 DATA 91,249,211,239,201,62,254,50,91,249,211,239,201,62,9,237,2656
1180 DATA 71,237,94,221,33,0,0,33,59,92,203,174,193,217,229,217,2073
1190 DATA 58,9,92,245,62,30,50,9,92,58,10,92,245,62,4,50,1168
1200 DATA 10,92,58,72,92,245,42,61,92,229,197,58,72,249,254,2,1825
1210 DATA 40,12,33,170,128,34,73,249,33,228,87,34,89,249,33,255,1747
1220 DATA 90,17,254,90,1,255,2,58,141,92,230,63,119,237,184,50,1883
1230 DATA 72,92,246,128,50,106,249,31,31,31,230,7,211,254,1,0,1739
1240 DATA 24,58,103,249,60,40,13,58,75,249,183,40,7,33,142,240,1574
1250 DATA 237,184,24,34,43,27,119,237,184,50,104,249,60,50,112,249,1963
1260 DATA 205,1,22,62,3,50,103,249,62,24,50,107,92,17,191,250,1488
1270 DATA 1,46,0,205,60,32,175,50,107,249,50,105,249,205,120,255,1909
1280 DATA 33,0,0,34,98,249,34,100,249,175,50,102,249,42,76,249,1740
1290 DATA 205,140,250,96,105,34,92,249,203,60,203,29,1,28,0,237,1932
1300 DATA 66,34,96,249,42,78,249,205,140,250,237,67,94,249,58,80,2194
1310 DATA 249,183,192,58,81,249,183,202,156,249,195,164,249,229,62,2,2703
1320 DATA 205,40,45,42,93,92,229,33,183,250,34,93,92,126,205,155,1917
1330 DATA 44,225,34,93,92,62,26,205,40,45,193,205,43,45,239,4,1595
1340 DATA 5,1,3,56,205,162,45,201,51,53,48,48,48,48,13,1035
1350 DATA 22,0,5,83,112,101,99,116,114,117,109,32,32,67,111,109,1229
1360 DATA 109,117,110,105,99,97,116,111,114,22,1,7,127,49,57,56,1297
1370 DATA 53,32,80,104,105,108,108,105,112,32,87,97,100,101,205,7,1436
1380 DATA 251,175,33,59,92,203,110,200,203,174,58,8,92,254,32,56,2000
1390 DATA 21,254,127,48,43,195,243,251,221,229,193,175,177,200,205,191,2773
1400 DATA 2,221,33,0,0,201,254,7,40,66,254,6,202,164,251,254,1955
1410 DATA 15,202,180,251,254,14,202,205,251,214,4,33,70,251,24,13,2183
1420 DATA 254,172,200,254,226,202,241,251,214,195,33,80,251,22,0,95,2690
1430 DATA 25,126,183,248,195,243,251,19,17,0,0,8,9,10,11,127,1472
1440 DATA 13,124,0,93,91,255,255,255,0,125,123,92,225,225,34,61,1971
1450 DATA 92,241,50,72,92,31,31,31,230,7,211,254,241,50,10,92,1735
1460 DATA 241,50,9,92,217,225,217,58,75,249,183,40,13,1,0,24,1694
1470 DATA 17,143,216,33,0,64,237,176,24,5,62,255,50,103,249,62,1696
1480 DATA 2,205,1,22,205,107,13,62,63,237,71,237,86,58,80,249,1698
1490 DATA 183,196,156,249,201,58,107,249,183,192,58,106,92,238,8,50,2326
1500 DATA 106,92,195,36,252,58,107,249,183,192,205,36,252,33,203,251,2450
1510 DATA 229,237,115,61,92,243,6,192,205,175,14,225,175,201,58,88,2316
1520 DATA 249,183,200,58,107,249,238,1,50,107,249,58,72,92,203,255,2371

```


PROGRAMS

1530 DATA 40, 7, 230, 7, 71, 7, 7, 176, 50, 106, 249, 205, 120, 255, 175, 1712
 1540 DATA 24, 51, 62, 126, 55, 33, 107, 249, 203, 70, 40, 41, 254, 64, 63, 208, 1650
 1550 DATA 254, 96, 40, 6, 48, 8, 214, 64, 24, 9, 62, 127, 24, 5, 254, 123, 1358
 1560 DATA 208, 214, 96, 245, 175, 50, 107, 249, 58, 72, 92, 246, 128, 50, 106, 249, 2345
 1570 DATA 205, 120, 255, 241, 55, 245, 6, 15, 205, 115, 254, 241, 201, 245, 205, 242, 2850
 1580 DATA 252, 58, 80, 249, 183, 40, 33, 205, 156, 249, 42, 92, 249, 41, 205, 204, 2338
 1590 DATA 252, 219, 239, 203, 95, 32, 17, 205, 84, 31, 56, 245, 205, 36, 252, 62, 2233
 1600 DATA 127, 219, 254, 31, 48, 249, 241, 201, 241, 33, 86, 249, 203, 70, 40, 13, 2305
 1610 DATA 33, 12, 254, 190, 32, 7, 245, 35, 126, 205, 108, 252, 241, 33, 84, 249, 2106
 1620 DATA 203, 70, 40, 5, 245, 205, 10, 253, 241, 79, 58, 82, 249, 254, 2, 40, 2036
 1630 DATA 18, 48, 14, 71, 121, 183, 234, 140, 252, 62, 1, 24, 1, 175, 168, 40, 1552
 1640 DATA 2, 203, 249, 121, 47, 79, 237, 91, 94, 249, 58, 91, 249, 246, 1, 211, 2228
 1650 DATA 239, 62, 1, 211, 247, 27, 6, 9, 98, 107, 0, 0, 205, 236, 252, 175, 1875
 1660 DATA 203, 57, 23, 211, 247, 16, 241, 58, 91, 249, 211, 239, 203, 58, 203, 27, 2337
 1670 DATA 58, 83, 249, 71, 25, 16, 253, 237, 87, 254, 9, 32, 32, 1, 2, 0, 1409
 1680 DATA 219, 247, 23, 56, 6, 237, 66, 216, 195, 207, 252, 229, 205, 242, 252, 225, 2877
 1690 DATA 237, 91, 92, 249, 6, 8, 237, 62, 216, 16, 251, 24, 224, 43, 124, 181, 2081
 1700 DATA 32, 251, 201, 205, 111, 253, 208, 245, 205, 10, 253, 241, 33, 85, 249, 203, 2785
 1710 DATA 70, 200, 203, 191, 33, 12, 254, 190, 192, 35, 126, 87, 58, 87, 249, 183, 2170
 1720 DATA 40, 24, 122, 203, 191, 254, 127, 32, 4, 62, 96, 24, 6, 254, 32, 48, 1519
 1730 DATA 9, 198, 64, 245, 22, 94, 205, 41, 253, 209, 58, 72, 249, 183, 40, 19, 1961
 1740 DATA 42, 89, 249, 124, 181, 40, 12, 43, 34, 89, 249, 42, 73, 249, 35, 34, 1585
 1750 DATA 73, 249, 114, 42, 100, 249, 1, 0, 8, 183, 237, 66, 200, 213, 237, 74, 2046
 1760 DATA 34, 100, 249, 58, 102, 249, 180, 50, 102, 249, 43, 237, 91, 98, 249, 25, 2116
 1770 DATA 11, 124, 160, 103, 125, 161, 111, 17, 143, 240, 25, 241, 119, 201, 0, 0, 1781
 1780 DATA 219, 247, 23, 48, 63, 219, 247, 23, 48, 58, 42, 96, 249, 205, 236, 252, 2275
 1790 DATA 219, 247, 23, 48, 47, 6, 8, 237, 91, 92, 249, 35, 98, 107, 43, 205, 1755
 1800 DATA 236, 252, 219, 247, 23, 203, 25, 16, 242, 197, 237, 87, 254, 9, 204, 7, 2458
 1810 DATA 251, 193, 42, 92, 249, 203, 60, 203, 29, 219, 247, 23, 48, 8, 43, 124, 2034
 1820 DATA 181, 0, 32, 245, 175, 201, 121, 47, 55, 201, 205, 137, 255, 33, 143, 240, 2271
 1830 DATA 237, 91, 98, 249, 25, 78, 19, 33, 255, 7, 122, 164, 103, 123, 165, 111, 1880
 1840 DATA 34, 98, 249, 42, 100, 249, 43, 34, 100, 249, 121, 205, 228, 253, 205, 120, 2330
 1850 DATA 255, 205, 242, 252, 201, 203, 191, 254, 32, 56, 11, 254, 127, 40, 7, 205, 2535
 1860 DATA 187, 255, 205, 159, 254, 201, 1, 10, 0, 33, 12, 254, 237, 177, 192, 62, 2239
 1870 DATA 9, 145, 7, 79, 33, 22, 254, 9, 94, 35, 86, 235, 233, 13, 10, 127, 1391
 1880 DATA 8, 9, 11, 12, 7, 255, 255, 42, 254, 50, 254, 54, 254, 63, 254, 67, 1849
 1890 DATA 254, 84, 254, 88, 254, 110, 254, 148, 254, 154, 254, 175, 50, 104, 249, 205, 2891
 1900 DATA 235, 255, 201, 205, 172, 254, 201, 205, 187, 254, 62, 32, 205, 187, 255, 201, 3111
 1910 DATA 205, 187, 254, 201, 33, 104, 249, 126, 214, 31, 56, 5, 119, 205, 172, 254, 2415
 1920 DATA 201, 205, 159, 254, 201, 205, 202, 254, 201, 205, 154, 254, 205, 91, 255, 175, 3221
 1930 DATA 50, 103, 249, 50, 104, 249, 205, 235, 255, 201, 221, 35, 251, 237, 77, 205, 2727
 1940 DATA 120, 255, 6, 200, 58, 72, 92, 31, 31, 31, 230, 7, 246, 24, 14, 247, 1664
 1950 DATA 238, 16, 211, 254, 197, 6, 70, 237, 80, 203, 18, 56, 6, 16, 248, 193, 2049
 1960 DATA 16, 238, 201, 193, 201, 62, 255, 50, 105, 249, 201, 175, 50, 105, 249, 201, 2551
 1970 DATA 33, 110, 249, 52, 33, 108, 249, 52, 33, 104, 249, 52, 201, 205, 235, 255, 2220
 1980 DATA 58, 103, 249, 254, 23, 40, 34, 60, 50, 103, 249, 201, 33, 110, 249, 53, 1869
 1990 DATA 33, 108, 249, 53, 33, 104, 249, 53, 240, 54, 31, 205, 235, 255, 33, 103, 2038
 2000 DATA 249, 53, 240, 175, 119, 50, 104, 249, 201, 17, 0, 64, 58, 80, 249, 183, 2091
 2010 DATA 32, 32, 42, 100, 249, 1, 170, 2, 237, 66, 56, 20, 237, 66, 56, 8, 1372
 2020 DATA 1, 8, 16, 33, 0, 72, 24, 14, 1, 2, 22, 33, 64, 64, 24, 6, 384
 2030 DATA 1, 1, 23, 33, 32, 64, 197, 6, 8, 197, 213, 229, 205, 114, 255, 1, 1579
 2040 DATA 32, 0, 237, 176, 225, 209, 193, 36, 20, 16, 238, 123, 198, 32, 95, 63, 1893
 2050 DATA 159, 230, 248, 130, 87, 125, 198, 32, 111, 63, 159, 230, 248, 132, 103, 193, 2448
 2060 DATA 16, 212, 65, 197, 6, 8, 197, 213, 98, 107, 54, 0, 19, 205, 114, 255, 1766
 2070 DATA 1, 31, 0, 237, 176, 209, 193, 20, 16, 236, 33, 32, 248, 25, 84, 93, 1634
 2080 DATA 193, 16, 224, 13, 58, 103, 249, 145, 50, 103, 249, 201, 33, 255, 87, 17, 1996
 2090 DATA 254, 87, 6, 192, 175, 119, 197, 205, 114, 255, 1, 32, 0, 237, 184, 193, 2251
 2100 DATA 16, 244, 201, 217, 205, 242, 252, 217, 201, 58, 104, 249, 254, 32, 200, 205, 2897
 2110 DATA 151, 255, 58, 106, 249, 42, 108, 249, 119, 201, 58, 104, 249, 254, 32, 200, 2435
 2120 DATA 58, 72, 92, 42, 108, 249, 119, 201, 58, 112, 249, 167, 200, 58, 103, 249, 2137
 2130 DATA 205, 158, 14, 58, 104, 249, 133, 111, 34, 110, 249, 124, 15, 15, 15, 230, 1824
 2140 DATA 3, 246, 88, 103, 34, 108, 249, 175, 50, 112, 249, 201, 245, 58, 104, 249, 2274
 2150 DATA 254, 32, 32, 7, 175, 50, 104, 249, 205, 172, 254, 205, 151, 255, 237, 91, 2473
 2160 DATA 110, 249, 241, 237, 75, 54, 92, 38, 0, 111, 41, 41, 41, 9, 58, 105, 1502
 2170 DATA 249, 79, 6, 8, 126, 169, 18, 20, 35, 16, 249, 201, 62, 1, 50, 112, 1401
 2180 DATA 249, 201, 254, 16, 16, 16, 16, 0, 0, 66, 66, 66, 66, 66, 60, 1174



Commodore 64 Program Editor

by Alexander Sassoon

MICROTEX
666

Still keying in programs? Forget it!
 This program is available for
 telesoftware downloading on
 Microtex 666 (page *666#.)

This program adds extra features to the Commodore 64 screen editor, including an automatic insert mode and the ability to scroll forwards or backwards through a listing. This removes the need to constantly list bits of a program and hit the Stop key when the part you want to see appears.

The TRACE / STEP / WALK utilities published in the December 1985 issue of APC can be made compatible with this program by entering the following line after both programs have been loaded:
 A=50371:POKE A, 188:POKE A+5, 199

Program Editor Controls

F 1	List program upwards	F 7	Cancel quote mode
F 3	List program downwards	SHIFT F 2	Change border colour
F 5	Auto-insert mode on/off	SHIFT F 4	Change screen colour

Bulletin Boards

Teletext

Viatel

X Modem

...all at your finger tips!

New XC handles all communication modes. Select on screen with minimum fuss, your own baud rates, number of bits, parity etc, or use any of 8 default settings.

- Baud rate converter not required!
- Pop up menus controlled by function keys.
- Print while you receive, without loss of data.
- Auto logging feature so you can see how much time you've spent on line.
- Down load file from Viatel, saves all screens.
- Written in Australia to suit Australian communications standards.
- Suitable for IBM PC or XT, or compatibles, Olivetti, Challenger etc. Requires 1200/75 baud modem and colour graphics or Hercules graphics card. (Hercules version available late February.)

\$95

- MICROSOFT MOUSE \$249
- QUICK BASIC \$175
- PC TUTORIAL \$49
- NEW SMARTKEY \$69
- TURBO PASCAL \$109
- TURBO TUTOR \$75
- LIGHTNING \$195
- HI-TECH C COMPILER For IBM \$295

C-Tech

in the city!

1st floor, 48 A'Beckett Street,
 Melbourne 3000
 Phone (03) 663 6580
 Software Mail Orders welcome.

MICROMASTER

— Simply Brilliant

MicroMaster is a new single board computer with more features and higher performance than previously thought possible in a board of this size. Based on the STD bus, it is possible to expand the MicroMaster into an extremely powerful multi-user system with hard disks. A friendly user interface and performance benefits are provided by Z-System, a CP/M compatible operating system with MSDOS and UNIX-like features.

NEW

FEATURES

- High performance microcoded CPU with pipelining
- Z-80 compatible but faster
- up to 512K bytes RAM with MMU
- monitor/boot PROM in 2732-27256
- two DMA channels for fast data transfers
- two 16-bit counter-timer channels
- 12 level interrupt controller
- two RS232 serial ports with on-board drivers
- Centronics parallel port
- Floppy disk controller for 3½, 5¼, 8-inch drives
- Support for new dual speed 5¼-inch drives
- Compatible with CP/M, Z-System, CP/M 3, TurboDOS
- Full 12 months warranty

Dealer and OEM enquiries welcome

For more information or to place orders(!) contact:



micromatrix Pty. Ltd.

24 Bridge Street
Eltham, Vic., 3095.
Ph. (03) 439 5155

[SHIFT] [F8] 'CONT'

[SHIFT] [F8] 'RUN'

No need to type in any line containing a REM statement.

```
1000 REM *****
1010 REM x
1020 REM x 'PROGRAM EDITOR'
1030 REM x
1040 REM x BI-DIRECTIONAL SCROLLING
1050 REM x
1060 REM x FOR COMMODORE 64
1070 REM x
1080 REM x BY ALEXANDER SASSOON
1090 REM x
1100 REM *****
```

```
1110 REM
1120 REM THIS PROGRAM ADDS THE
1130 REM FOLLOWING FEATURES TO THE
1140 REM COMMODORE SCREEN EDITOR:
1150 REM
```

```
-----
1160 REM BI-DIRECTIONAL SCROLLING OF
1170 REM A PROGRAM LISTING
1180 REM
1190 REM
```

```
1200 REM HOLD DOWN THE [F3] KEY TO
1210 REM SCROLL FORWARDS THROUGH A
1220 REM PROGRAM LISTING; HOLD DOWN
1230 REM [F1] TO SCROLL BACKWARDS.
1240 REM
```

```
1250 REM THE EDITOR WILL STOP LISTING
1260 REM AS SOON AS EITHER KEY IS
1270 REM RELEASED. THE PROGRAM MAY
1280 REM THEN BE EDITED OR COMMANDS
1290 REM ENTERED IN THE NORMAL WAY.
1300 REM
```

```
1310 REM WHERE THERE ARE NO LINES
1320 REM ALREADY LISTED ON THE SCREEN
1330 REM THE EDITOR WILL LIST FROM THE
1340 REM BEGINNING OF THE PROGRAM IF
1350 REM SCROLLING FORWARDS, AND FROM
1360 REM THE LAST LINE OF THE PROGRAM
1370 REM IF SCROLLING BACKWARDS.
1380 REM
```

```
1390 REM THE [F1] KEY HAS NO EFFECT
1400 REM ONCE THE FIRST LINE IS LISTED
1410 REM ON THE SCREEN; [F3] HAS NO
1420 REM EFFECT ONCE THE LAST LINE OF
1430 REM THE PROGRAM IS REACHED.
1440 REM
```

```
1450 REM SINCE THE EDITOR ACTUALLY
1460 REM READS THE LINE NUMBERS FROM
1470 REM THE SCREEN, IT IS POSSIBLE TO
1480 REM SWITCH FREELY BETWEEN SCROLL-
1490 REM ING FORWARDS AND BACKWARDS.
1500 REM
```

```
1510 REM A STARTING-LINE MAY BE SPEC-
1520 REM IFIED BY TYPING A LINE NUMBER
1530 REM BEFORE PRESSING [F1] OR [F3].
1540 REM
```

```
1550 REM THE CURSOR NEED NOT BE MOVED
1560 REM TO THE TOP OR BOTTOM OF THE
1570 REM SCREEN BEFORE SCROLLING, BUT
1580 REM MUST BE AT THE START OF A
1590 REM SCREEN LINE UNLESS A STARTING-
1600 REM POINT IS TO BE SPECIFIED.
1610 REM
```

```
1620 REM PROGRAM LINES LONGER THAN THE
1630 REM STANDARD EIGHTY CHARACTERS
1640 REM WILL COVER UP THE FOLLOWING
1650 REM LINE WHEN LISTING BACKWARDS.
1660 REM SUCH LINES MAY BE LISTED
1670 REM FORWARDS WITHOUT HIDING
1680 REM THE NEXT PROGRAM LINE.
1690 REM
```

```
1700 REM THE ADDRESS OF THE SCREEN
1710 REM SHOULD NOT BE MOVED FROM
1720 REM THE DEFAULT LOCATION ($0400).
1730 REM
1740 REM
```

```
-----
1750 REM AUTOMATIC INSERT MODE
1760 REM
```

```
1770 REM AUTO-INSERT MODE IS ACTIVATED
1780 REM BY PRESSING [F5].
1790 REM
```

```
1800 REM IN THIS MODE THE CURSOR STOPS
1810 REM BLINKING AND ANY CHARACTERS
1820 REM ENTERED ARE AUTOMATICALLY
1830 REM INSERTED IN FRONT OF THE
1840 REM CURSOR.
1850 REM THE DELETE AND CURSOR KEYS
1860 REM WORK NORMALLY.
1870 REM
```

```
1880 REM AUTO-INSERT MODE IS CANCELLED
1890 REM BY PRESSING [F5] AGAIN,
1900 REM [RETURN] OR [SHIFT][RETURN].
1910 REM
```

```
-----
1920 REM MISCELLANEOUS FEATURES
1930 REM
```

```
1940 REM
1950 REM [F7] CANCELS THE EFFECT OF
1960 REM TYPING A QUOTE MARK - THE
1970 REM CURSOR KEYS ETC. WILL WORK
1980 REM NORMALLY AGAIN.
1990 REM
```

```
2000 REM THE DEFAULT SCREEN AND BORDER
2010 REM COLOURS ARE SET TO BLACK WITH
```

```
2020 REM GREEN PRINT.
2030 REM PRESS [F2] TO STEP THROUGH
2040 REM THE AVAILABLE BORDER COLOURS
2050 REM AND [F4] TO STEP THROUGH THE
2060 REM SCREEN COLOURS ALL THE
2070 REM KEYS ARE SET TO AUTO-REPEAT.
2080 REM
```

```
2090 REM [F6] EXECUTES THE 'CONT'
2100 REM COMMAND AND [F8] WILL
2110 REM 'RUN' THE BASIC PROGRAM.
2120 REM
```

```
2130 REM *****
2140 REM x READ MACHINE CODE DATA x
2150 REM *****
2160 REM THE MACHINE CODE IS LOCATED
2170 REM IN UNUSED MEMORY AND DOES NOT
2180 REM REDUCE THE MEMORY AVAILABLE
2190 REM FOR BASIC PROGRAMS.
2200 REM
```

```
2210 REM THE EDITOR IS STORED BETWEEN
2220 REM $C53E TO $CA31 AND USES ZERO
2230 REM PAGE LOCATIONS $FB AND $FE.
2240 REM THE MAIN, ERROR, NMI AND IRQ
2250 REM VECTORS ARE ALTERED.
2260 REM
```

```
2270 REM THE PROGRAM EDITOR SHOULD
2280 REM NOT BE USED WITH OTHER
2290 REM PROGRAMS THAT MAKE USE OF
2300 REM THESE LOCATIONS OR VECTORS.
2310 REM
```

```
2320 PRINT CHR$(147); CHR$(17)
2330 DIM ERR(89)
2340 DEF FN DEC(X) = ASC(MID$(MCODE$,X))
```

```
-65
2350 FOR LINE=0 TO 89
2360 PRINT CHR$(145); 'READING DATA FROM
LINE': 3220 + LINE*10
2370 SUM=0 .CHECK=0
2380 FOR WRD=0 TO 10 STEP 2
2390 READ MCODE$
```

```
2400 N1 = FN DEC(1)*26 + FN DEC(2)
2410 N2 = FN DEC(3)*26 + FN DEC(4)
2420 IF N1>255 THEN N1=N1-256 .CHECK=CHR
```

```
CK+2*WRD
2430 IF N2>255 THEN N2=N2-256 CHECK=CHR
CK+2*(WRD+1)
2440 IF N1>255 OR N2>255 OR N1<0 OR N2<0
THEN 2470
```

```
2450 POKE 50494 + LINE*12 + WRD, N1
2460 POKE 50495 + LINE*12 + WRD, N2
2470 SUM = SUM + N1*(WRD+1) + N2*(WRD+2)
2480 NEXT WRD
2490 IF CHECK <> SUM-INT(SUM/4093)*4093
THEN ERR(LINE)=1
```

```
2500 NEXT LINE
2510 :
2520 REM PRINT LIST OF BAD LINES
2530 FOR LINE=0 TO 89
2540 IF ERR(LINE) THEN PRINT "PLEASE CHE
CK DATA IN LINE": 3220 + LINE*10 :ERR=1
```

```
2550 NEXT LINE
2560 IF ERR THEN END
2570 :
2580 PRINT CHR$(147)
2590 PRINT "MACHINE CODE ENTERED OK"
```

```
2600 FOR I=1 TO 11
2610 READ STRING$
2620 STRING$ = STRING$+CHR$(0)
2630 FOR CHAR=1 TO LEN(STRING$)
2640 POKE 51568+CHAR*PNTR, ASC(MID$(STR
```

```
ING$,CHAR))
2650 NEXT CHAR
2660 PNTR = PNTR + LEN(STRING$)
2670 NEXT I
2680 :
```

```
2690 REM *****
2700 REM x SAVE IN MACHINE CODE FORM x
2710 REM *****
2720 REM THE MACHINE CODE SAVED BY
2730 REM THIS SECTION CAN BE LOADED
2740 REM WITHOUT DESTROYING ANY BASIC
2750 REM PROGRAM ALREADY IN MEMORY.
2760 REM
```

```
2770 REM TO LOAD AND INITIALISE THE
2780 REM THE PROGRAM EDITOR ADD THE
2790 REM FOLLOWING LINES TO THE
2800 REM BEGINNING OF YOUR PROGRAM:
2810 REM 1 IF K THEN SYS 50500
2820 REM 2 K=1 :LOAD
```

```
2830 REM
2840 REM FOR DISK CHANGE THE 2ND LINE:
2850 REM 2 K=1:LOAD "EDITOR.MCODE".8
2860 REM
```

```
2870 REM AFTER RUNNING YOUR PROGRAM
2880 REM BOTH THE LINES SHOULD BE
2890 REM REMOVED.
2900 REM
```

```
2910 PRINT
2920 PRINT 'SAVE MACHINE CODE? (PRESS Y
OR N)
2930 GET KEY$. IF KEY$<>"Y" AND KEY$<>"N"
THEN 2930
```

```
2940 IF KEY$="N" THEN 3130
2950 PRINT "DISK OR TAPE? (PRESS D OR T)
2960 GET KEY$: IF KEY$<>"D" AND KEY$<>"T"
THEN 2960
2970 DEVICE=1
2980 IF KEY$="D" THEN DEVICE=8
```

```
2990 :
3000 REM CALL KERNAL ROUTINES TO SAVE
3010 REM A BLOCK OF MACHINE CODE
3020 REM
```


PROGRAMS

```

3030 SYS (57812) EDITOR MCODE .DEVICE,1
3040 REM POKE START AND END ADDRESSES
3050 POKE 252,62 : POKE 253,197
3060 POKE 781,50 : POKE 782,202
3070 POKE 780,252
3080 SYS 57695
3090 :
3100 REM *****
3110 REM x INITIALISE PROGRAM EDITOR x
3120 REM *****
3130 SYS 50500
3140 :
3150 REM TO CANCEL THE EDITOR ENTER:-
3160 REM SYS 58451 :SYS 10
3170 REM
3180 :
3190 REM *****
3200 REM x COMPACTED MACHINE CODE DATAx
3210 REM *****
3220 DATA LC1H,GDCY,IPHR,GNAF,PHFE,JYGN
3230 DATA JWPB,BGRW,PHBH,RMBG,QZHS,QJRC
3240 DATA PHJW,JZGN,RNFL,JXJZ,CEQA,HPGG
3250 DATA FPPI,KUJZ,FKKU,JZGG,GVEQ,PIKQ
3260 DATA JZPG,AVAD,DKGG,HFFM,JYJZ,PGAD
3270 DATA JZQC,AGEE,AAQJ,AFFM,LCIA,PGLD
3280 DATA IAPH,FEAC,QJJI,OZJR,EEAC,GECU
3290 DATA FIMQ,FWMQ,QJDT,PHKJ,SJQM,KJIN
3300 DATA LSKN,BGHS,JMBG,IRJW,IAAJ,BGQD
3310 DATA JTLG,KULU,CYDR,RLBG,JAJU,QFJR
3320 DATA JGAE,QFHZ,RWAD,MUCA,JACY,OTSW
3330 DATA LCLG,HPFE,ESDY,ETLC,ELJW,KJGJ
3340 DATA TFMU,FDGI,GGAA,BGIA,RNRP,ANTC
3350 DATA KCPX,JWAC,SHZT,FMQJ,HUQG,GJJD
3360 DATA FDRQ,QFSC,OZHT,FWMQ,PECU,QFRW
3370 DATA JGBQ,MUCG,IWGI,TNUG,BGGK,SAIA
3380 DATA KIRP,BGPK,KUHT,GEGU,KAHT,EZQQ
3390 DATA AQGF,FCSE,OYIE,CUGN,POLC,KSIX
3400 DATA FCSE,PAIE,EABG,AWST,GJRM,DZRS
3410 DATA FLPM,ACGO,QNPH,ACIA,AHQF,IEAF
3420 DATA IIRW,KMGJ,RLRP,AERW,ADMU,IWRN
3430 DATA RPKB,IAAD,MURM,RMPE,TCIC,LCOU
3440 DATA RMBG,GYIU,HTFB,RWJZ,CYTA,IUHT
3450 DATA PCRW,KCGA,AFAC,SAOY,ITQE,IILIA
3460 DATA CNGI,IERW,MFRP,PDWR,JZTA,BGRW
3470 DATA HTPF,RWJZ,TABH,IAGG,AAHT,PFWR
3480 DATA ANHH,KCGH,LCAW,STIY,SMKA,RWTH
3490 DATA QJKJ,RPFG,IAAN,HHSY,SYLC,AWST
3500 DATA SUIQ,ADIA,JLGN,KJHT,FFRW,AHQF
3510 DATA JRCU,ABFD,JRFW,GAQA,RPAN,IAAF
3520 DATA FCTN,MUJY,IWHT,FLRW,ACDY,JRMU
3530 DATA TJHP,EQGF,RUJG,AMGF,RUGS,FFJY
3540 DATA GEJW,FCHZ,UMAT,SWNO,NWEA,EEEA
3550 DATA NWEA,BGNC,HFRD,AGBG,NSHR,CEGU
3560 DATA NKQF,SCHT,AWGU,JZLC,ORRO,LCDE
3570 DATA HRQQ,MOBG,KPQG,GEJW,QFNN,AYNX
3580 DATA AFD,NNFD,ACIW,DSIW,DRRW,ACSS
3590 DATA NDUQ,DRRW,TIRD,QRDR,HSKN,NNTC
3600 DATA NHRD,QRDR,FOAU,RDGR,NNQZ,KRIW
3610 DATA DRRW,JYIW,OSQA,JWFC,JRRO,DYAP
3620 DATA FCJU,FCHW,FKPM,JYLC,QUHQ,CYSD
3630 DATA GGGJ,LNDZ,DRGJ,BSDZ,DSRM,NGGJ
3640 DATA DRRP,JURW,ACHQ,NDQA,ADRW,RNBB
3650 DATA GYHQ,GEJW,QRBR,ROAR,LNTC,ARKU
3660 DATA GIID,JGAK,QGRX,GJRY,BGGW,RNML
3670 DATA GMRO,NOBO,NWEA,NGMU,ETQE,GAJW
3680 DATA GGKU,BKSI,SRGN,KMMU,AWST,QJKU
3690 DATA FDFU,DFRQ,DKD,OPYE,DZPZ,GJPY
3700 DATA MAIZ,DFRQ,DFRQ,DFRQ,DFRQ
3710 DATA LUKK,DFRQ,DFRQ,DFRQ,DFRQ
3720 DATA FDFU,DFRQ,DFRQ,DFRQ,DFRQ
3730 DATA QWHR,DFRQ,DFRQ,DFRQ,DFRQ
3740 DATA QJPY,DFRQ,DFRQ,DFRQ,DFRQ
3750 DATA NQDN,DFRQ,DFRQ,DFRQ,DFRQ
3760 DATA JZCY,DFRQ,DFRQ,DFRQ,DFRQ
3770 DATA FDFU,DFRQ,DFRQ,DFRQ,DFRQ
3780 DATA TPQA,DFRQ,DFRQ,DFRQ,DFRQ
3790 DATA NNNJ,DFRQ,DFRQ,DFRQ,DFRQ
3800 DATA FDFU,DFRQ,DFRQ,DFRQ,DFRQ
3810 DATA KUEE,DFRQ,DFRQ,DFRQ,DFRQ
3820 DATA FDFU,DFRQ,DFRQ,DFRQ,DFRQ
3830 DATA BHTJ,DFRQ,DFRQ,DFRQ,DFRQ
3840 DATA SUJX,DFRQ,DFRQ,DFRQ,DFRQ
3850 DATA TCRS,DFRQ,DFRQ,DFRQ,DFRQ
3860 DATA JYHQ,DFRQ,DFRQ,DFRQ,DFRQ
3870 DATA APSI,DFRQ,DFRQ,DFRQ,DFRQ
3880 DATA RWIM,HSGB,DFRQ,DFRQ,DFRQ
3890 DATA MUDS,RNGJ,DFRQ,DFRQ,DFRQ
3900 DATA SUJW,FDFQ,DFRQ,DFRQ,DFRQ
3910 DATA MUCJ,HRGJ,DFRQ,DFRQ,DFRQ
3920 DATA HTBN,TCKB,DFRQ,DFRQ,DFRQ
3930 DATA QEBG,NUIC,DFRQ,DFRQ,DFRQ
3940 DATA SFCY,DYSK,DFRQ,DFRQ,DFRQ
3950 DATA GQJA,AAQJ,DFRQ,DFRQ,DFRQ
3960 DATA CYDQ,RNQG,DFRQ,DFRQ,DFRQ
3970 DATA AZQN,GILL,DFRQ,DFRQ,DFRQ
3980 DATA FCRN,BGGL,DFRQ,DFRQ,DFRQ
3990 DATA LCMH,QLBG,DFRQ,DFRQ,DFRQ
4000 DATA QLUH,RWIT,DFRQ,DFRQ,DFRQ
4010 DATA QJNG,QARP,DFRQ,DFRQ,DFRQ
4020 DATA LCMP,QLBG,DFRQ,DFRQ,DFRQ
4030 DATA MHOL,SCHT,DFRQ,DFRQ,DFRQ
4040 DATA QJNU,LCGL,DFRQ,DFRQ,DFRQ
4050 DATA KASM,AIWA,DFRQ,DFRQ,DFRQ
4060 DATA FCRN,BGMJ,DFRQ,DFRQ,DFRQ
4070 DATA BGMH,QLBG,DFRQ,DFRQ,DFRQ
4080 DATA SMAE,IAKB,DFRQ,DFRQ,DFRQ
4090 DATA PGPE,ACMU,DFRQ,DFRQ,DFRQ
4100 DATA RGRP,ANBG,DFRQ,DFRQ,DFRQ
4110 DATA RQHK,RGRG,DFRQ,DFRQ,DFRQ
4120 REM
4130 REM IF ERRORS ARE REPORTED IN ALL
4140 REM THE DATA LINES THEN CHECK
4150 REM PROGRAM LINES 2340 TO 2360.
4160 :
4170 REM *****
4180 REM x STRING DATA x
4190 REM *****
4200 DATA LIST PROGRAM UPWARDS
4210 DATA LIST PROGRAM DOWNWARDS
4220 DATA AUTOMATIC INSERT MODE ON/OFF
4230 DATA CANCEL QUOTE MODE
4240 DATA CHANGE BORDER COLOUR
4250 DATA CHANGE SCREEN COLOUR
4260 DATA 'CONT'
4270 DATA 'RUN'
4280 DATA PROGRAM EDITOR CONTROLS
4290 DATA PRESS ANY KEY
4300 DATA 1352746P
4310 END

```



HATS OFF TO AN ASSEMBLY LANGUAGE TEACHING SYSTEM THAT WORKS

Assembly language programming isn't easy, but you don't have to be a genius to learn it. Let your PC teach it to you.

The Visible Computer: 8088 is a skillful blend of text and software for mastering the elusive skills of assembly language.

It's an animated simulation of the 8088 microprocessor that lets you see with your own eyes how the 8088 works. You'll be using it as a debugging tool for years to come.

It's a tutorial. The 350 page manual is more than instructions on running the simulator — it may just be the best book on assembly language ever written.

It's 45 demonstrations programs you'll work through with the 8088 simulator, from simple register loads to advanced interrupt driven one generators and file utilities.

ALSO AVAILABLE FOR APPLE & COMMODORE

The Visible Computer: 8088 for the IBM PC, and compatibles: \$115. If your dealer doesn't have it, order direct:

HYPEC ELECTRONICS PTY. LTD.

21 Ryedale Road
West Ryde NSW 2114
Ph: (02) 808-3666, 808-3050



MICROTEK 666

Still keying in programs? Forget it! This program is available for telesoftware downloading on Microtek 666 (page *6663#.)

Pascal PEEK & POKE by E Crawford



These programs developed under Apple II Pascal 1.2, provide PEEK and POKE facilities, which are missing in Apple Pascal. They also provide integer (two-byte) WORDPEEK and WORDPOKE facilities. They can be installed in the System Library and accessed easily by a "USES PEEKPOKE" declaration. Thus, a system programmer can take full advantage of the Pascal language, while only using assembler language when speed demands it.

The file "PEEKPOKE.TEXT" (listing 1) contains assembler language declarations of two functions and two procedures. Functions PEEK and WORDPEEK return integer values; Procedures POKE and WORDPOKE are also defined and comments show how they are declared in Pascal. (Macros are used to process data a word at a time).

The file "PEEKUNIT.TEXT" (listing 2)

contains a Pascal UNIT declaration. When installed in SYSTEM.LIBRARY, this allows a "USES PEEKPOKE" declaration, instead of needing four "EXTERNAL" declarations.

To use these programs:

1. Assemble PEEKPOKE.TEXT to PEEKPOKE.CODE
2. Compile PEEKUNIT.TEXT to PEEKUNIT.CODE
Note: The \$S+ swapping option must be used (as shown) for compiling units.
— The boot disk must be on-line for swapping.
— It is easiest to copy PEEKUNIT.TEXT onto the boot disk (eg, APPLE 1: for compiling)
3. There is no need to link these two code files before putting them in the system library, in fact, it won't work.

PROGRAMS



PORT SWITCH
KENT DESIGN
Another Quality Kent Design Product
Eliminates need for Multiple Printers — serial or parallel.
FROM \$186 includes all cables & plugs.
KENT DESIGN Ph: 509 8751
10 CLAREMONT AVE MALVERN 3144

4. Install the two code files, separately, into two "slots" of SYSTEM.LIBRARY. To do this, you will need to create a new library, copy all SYSTEM.LIBRARY slots into it, add the new files, and replace the old SYSTEM.LIBRARY. (see Apple Pascal books).
5. To call these facilities, use a "USES PEEKPOKE" declaration in your Pascal program.

If you use the "RUN" compiling option, linking is fully automatic. If you use the "Compile" option, you will need to link, using SYSTEM.LIBRARY as the library file. The file PEEKTEST (listing 3) both tests and demonstrates these new facilities. It includes a "Beep" which PEEKs 2,000 times, and a routine to "POKE (20,15)" 2,000 times.


New
DISC BASED DATA BASE
for

VZ200 LE' VZ D' BASE V1.8 STATEMENT V2.0
VZ300 \$98.00 \$185.00

Statement is for small business use. Send statements, pay in amounts, all credit & debit calculations carried out.

Also other exclusive software send large S.A.S.E. for VLISTZ

VSOFTWAREZ
39 Agnes St., Toowong Qld 4066
Ph (07) 371 3707



V COMPUTERS
IATEL PTY LTD

FC 1200-120 CPS 80 CLMS
FC 1500-18 CPS 136 CLMS

Near letter quality,
quiet printing
noise level less
than 55db.
Tractor and friction
free standard.

Dealers Wanted

288 2144

24 Burwood Highway, Burwood

Listing 1

```

.TITLE "PEEK, POKE, WORDPEEK and WORDPOKE for PASCAL"
;File PEEKPOKE.TEXT - PEEK & POKE routines for PASCAL
;E. Crawford... 3-JUL-85
;
; .NOMACROLIST ;Suppress macro expansion
;
; .MACRO POF ;For a Word
PLA
STA %1
PLA
STA %1+1
.ENDM
;
; .MACRO PUSH ;Push a Word onto stack
LDA %1+1
PHA
LDA %1
PHA
.ENDM
;
ADDRESS .EQU 0 ;Indirect Address pointer
;
; .FUNC PEEK, 1 ;1 word referred
;Peeks a Byte at the given address
;Define in Pascal as :
; FUNCTION PEEK (ADDRESS : INTEGER) : INTEGER;
; EXTERNAL;
;or
; USES PEEKPOKE;
;
; JMP START
DATA .WORD 0 ;For result
RETURN .WORD 0 ;For Pascal return address
;
START POP RETURN ;Save Return Address
PLA ;Clear Stack Bias
PLA
PLA
PLA
POP ADDRESS ;Save Peeking address in Page 0
LDY #0
LDA (ADDRESS),Y ;Peek
STA DATA
LDA #0 ;High Byte = 0
STA DATA+1
PUSH DATA ;Restore stack
PUSH RETURN
RTS ;Return to PASCAL
;
; .PROC POKE, 2 ;2 words referred
;Pokes a Byte at the given address
;Define in Pascal as:
; PROCEDURE POKE (ADDRESS, DATA : INTEGER);
; EXTERNAL;
;(Do not use VAR before ADDRESS or DATA)
;or:
; USES PEEKPOKE;
;
; JMP START
DATA .WORD 0 ;Data Buffer
RETURN .WORD 0 ;for Pascal Return Address
;
START POP RETURN ;Save Return address
POP DATA ;Save Data to POKE
POP ADDRESS ;Save poking address
LDA DATA ;Low Byte

```


PROGRAMS

```

LDY    #0
STA    (ADDRESS),Y    ;Poke low byte
PUSH   RETURN
RTS
;
; .FUNC  WORDPEEK, 1          ;1 word referred
;Peeks a WORD (2-byte integer) at the given address
;Define in Pascal as :
; FUNCTION WORDPEEK (ADDRESS : INTEGER) : INTEGER;
; EXTERNAL;
;or
; USES PEEKPOKE;
;
; JMP    START
DATA   .WORD  0          ;For result
RETURN .WORD  0          ;For Pascal return address
;
START  POP    RETURN    ;Save Return Address
      PLA    ;Clear Stack Bias
      PLA
      PLA
      PLA
      POP    ADDRESS    ;Save Peeking address in Page 0
      LDY    #0
      LDA    (ADDRESS),Y    ;Peek Low Byte
      STA    DATA
      INY
      LDA    (ADDRESS),Y    ;Peek High Byte
      STA    DATA+1
      PUSH   DATA        ;Restore stack
      PUSH   RETURN
      RTS                ;Return to PASCAL
;
; .PROC  WORDPOKE, 2          ;2 words referred
;Pokes a WORD (2-byte integer) at the given address
;Define in Pascal as:
; PROCEDURE WORDPOKE (ADDRESS, DATA : INTEGER);
; EXTERNAL;
;(Do not use VAR before ADDRESS or DATA)
;or:
; USES PEEKPOKE;
;
; JMP    START
DATA   .WORD  0          ;Data Buffer
RETURN .WORD  0          ;for Pascal Return Address
;
START  POP    RETURN    ;Save Return address
      POP    DATA      ;Save Data to POKE
      POP    ADDRESS    ;Save poking address
      LDA    DATA      ;Low Byte
      LDY    #0
      STA    (ADDRESS),Y    ;Poke low byte
      INY
      LDA    DATA+1
      STA    (ADDRESS),Y    ;Poke High byte
      PUSH   RETURN
      RTS                ;Return to Pascal
;
; .END

```

Listing 2

```

(**L PRINTER:*)
(**S**)
UNIT PEEKPOKE;
(* File PEEKUNIT.TEXT *)

INTERFACE

PROCEDURE POKE (ADDRESS, DATA : INTEGER);
PROCEDURE WORDPOKE (ADDRESS, DATA : INTEGER);
FUNCTION PEEK (ADDRESS : INTEGER) : INTEGER;
FUNCTION WORDPEEK (ADDRESS : INTEGER) : INTEGER;

IMPLEMENTATION

PROCEDURE POKE ;
EXTERNAL;

```



Program Like A Pro With Peeks 'n Pokes, The Inside Track

"Programs' source code well balanced, easy to follow . . . Many useful segments of code were included in our applications . . . has saved me much time, effort, research and frustration."

— Peeks 'n Pokes Users

"Adds real power in application development . . . the first software package that delivers what is stated in its advertising . . ."

— Inside Track Users

With Peeks 'n Pokes, you learn how to use PEEK, POKE, INP, OUT and DOS/BIOS function calls to do things you can't normally do with BASIC or Pascal! For instance:

- Access the system's configuration
- Unprotect BASIC programs
- Scroll part or all of the screen
- Access the file directory
- Logically swap printers
- Read and change the keyboard
- Find more PEEKs and POKEs
- And much more!

The disk includes 58 programs with a menu to run them. The 38-page manual explains the programs and related techniques. Peeks 'n Pokes is only \$55. Programmer's Journal says

"The first time you use just ONE of these routines it will have paid for itself."

The Inside Track's routines give your programs speed and control. For example:

- Read and write files as fast as DOS
- Control the keyboard
- Reserve memory for your use
- Copy memory to another location
- Display screen data much faster
- Load big programs FAST
- Copy-protect your programs
- And much more!

There are 61 programs on the disk. The 42-page manual explains each program and gives tips. You get a fold-out memory map, too!

The Inside Track is only \$75. *"Best investment this software house has made in software"* according to one user.

ORDER BOTH PACKAGES TODAY!!!

**HYPEC ELECTRONICS
PTY. LTD.**

21 Ryedale Road
West Ryde NSW 2114

Ph: (02) 808-3666, 808-3050



PROGRAMS



Amstrad AMSDRAW

by Conrad Chin

This is a multi-featured drawing program for the CPC464, but will work on the CPC664 if the cassette commands are changed for disks. The cursor is displayed as a cross on the screen. Also shown is a flashing dot known as the fixed point (FP); this point is used as a centre for some of the drawing routines. To move it to the cursor position, press ENTER. At the bottom of the screen is a status line which shows the following information:

X — the X coordinate of the cursor.
Y — the Y coordinate of the cursor.
S — the cursor speed (1,2 or 3).
G — gives the graphics print mode (normal, X-or, or, and).
P — current pen number (0-15).
R — gives information on the reference points (up to four). A square in place of any of the numbers indicates that the reference point is in use.

Controls

Cursor keys — move the cursor.
ENTER — moves the FP to the cursor.
S — changes cursor speed.
G — changes graphics print mode.
R & (1,2,3 or 4) — sets a reference point to the cursor position.
DEL & (1,2,3 or 4) — sets a reference point.
1,2,3 & 4 — moves the cursor to the corresponding reference point.
CTRL S — saves screen to tape.
CTRL L — loads in previously-saved screen.
CTRL CLR — clears the screen.
A — abort: used to escape from various routines (for example, the airbrush).
P — replaces the status line with the colour palette. The left/right cursor keys can then be used to select the desired PEN. To change the ink, press C and use the up/down cursor keys to select the ink, followed by ENTER. Pressing R will reset the inks to their initial state. Press ENTER when finished with the palette.
SHIFT — displays the command line. To select a function, position the cursor under the appropriate symbol and

press ENTER while still holding down SHIFT.

Functions available on command line

Line — draws a line from the FP to the cursor. The FP is also moved to the cursor so that other lines can be drawn from the end of the last one.

Circle — draws a circle with the centre at the FP and the cursor on the circumference. There is an option to draw the circle filled. Press A to abort without drawing anything.

Ellipse — draws an ellipse centred on the FP, such that the cursor lies at the end of the major axis. You must enter the ratio of major-to-minor axis times 100, so that entering 100 will draw a circle. To draw the ellipse filled in, precede the ratio with the letter J. If you only want to draw a section of the ellipse (an arc), enter the ratio as a negative number. You then enter the start and finish angles in degrees; these are measured in an anticlockwise direction from the line joining the FP to the cursor. Entering a ratio of 0 will return without drawing anything.

Arc — this draws an arc from the FP to the cursor over an angle which you enter. A negative angle will draw the arc in the other direction. Entering an angle of 0 will return without drawing anything.

F — fills an enclosed area which contains the cursor. Press A to stop at any time.

T — allows you to put text on the screen until you press ENTER.

R — switches on rubber band mode. A line is dragged around the screen between the cursor and the FP. Pressing ENTER sets the line, while A erases it and returns to normal.

A — calls the airbrush routine. The cursor is now displayed as a square covering the spray area. Use SHIFT and cursor left/right to change the area. ENTER starts/stops spraying. F fills the area with the current pen colour. A returns to normal.



AMSTRAD 50 GAMES ON CASSETTE FOR ONLY \$24.95

Including Postage

CASSETTE-50 includes Arcade type games, War, Adventure, Logical, Tactical and Educational games, A Flight simulator, and a Business strategy game.

Hours of Entertainment at a fraction of the cost of other computer games.

SEND TODAY \$24.95

TO KOOLAN EMPORIUM

P.O. BOX 75
KOOLAN ISLAND,
W.A. 6733

Please supply _____ copies
of cassette-50 @ \$24.95ea
I enclose my cheque/money
order for \$ _____ OR
Please debit my Bankcard account
with \$ _____
My account number is _____

Signature _____

Expire Date _____

Name _____

Address _____

Post Code _____

```
10 REM "Paint" by Conrad Chin
20 ON ERROR GOTO 4290
30 ON BREAK GOSUB 3370:DEFINT a-z
40 DIM a!(72),c!(72),xr(4),yr(4),r*(4),pal(15),as1(100),as2(100)
50 CALL @BC02:PEN 1:PAPER 0
60 GOSUB 410
70 GOSUB 810
80 GOSUB 2190
90 SPEED KEY 20,B:GOSUB 3970:ok=-1
100 WHILE ok
110 GOSUB 2240
120 IF com THEN GOSUB 2340:k*="":GOTO 320
130 x1=x:y1=y
140 GOSUB 1320
```

Software Duplication

Are you wasting your time...

Why waste valuable software developmental time duplicating and packaging your software when you should be developing the next generation product.

Consider the advantages:

TOP QUALITY: We only use the highest quality magnetic media for our disks and tape.

LOW COST: Our prices start at \$2.38 per disk which includes the disk and duplication fee.

CONFIDENTIALITY: All clients' products are safeguarded by a written copyright agreement.

CONVENIENT: We offer label printing and affixing as well as packaging.

FORMATS: Most computer disk formats can be duplicated including Apple, IBM and Commodore.

We are the experts. We make the marketing of software easy.

Data Transfer

Whether you are an end user or a software supplier you may need to transfer system or data files to another computer.

Consider the possibilities:

Transfer between similar operating systems but with different disk formats. For example Osborne CP/M to Morrow CP/M or IBM PC DOS to Apricot MS-DOS.

Transfer between different operating systems. For example Osborne CP/M to IBM PC DOS or Apple DOS 3.3 to CP/M.

All the popular disk sizes are catered for -

31/2" - 51/4" - 8"

For worry free data transfers we are the experts.



INDEPENDENT SOFTWARE DUPLICATION

3 Park Ave. Westmead NSW 2145

Telephone (02) 635 0704
(02) 633 5944

```

150 ch=((x1-x)OR(y1-y))
160 IF ch AND rb THEN GOSUB 2580:GOSUB 2540
170 IF ch THEN x2=x:y2=y:x=x1:y=y1:GOSUB 2190:x=x2:y=y2:GOSUB 2190:GOSUB 1370:k$
=="
180 IF k$=c$ THEN GOSUB 960
190 IF k$="g" THEN GOSUB 750
200 IF k$="r" THEN GOSUB 2010:k$=""
210 IF k$=CHR$(127) THEN GOSUB 2090:k$=""
220 IF rb THEN GOSUB 350:GOTO 320
230 GOSUB 2240
240 IF k$="p" THEN GOSUB 1130
250 IF k$>"0"AND k$<"5" THEN GOSUB 2190:GOSUB 1970:GOSUB 2190
260 GOSUB 1410
270 IF k$=CHR$(13) THEN SOUND 129,150,10,4:GOSUB 2290
280 IF k$=CHR$(12) THEN GOSUB 3610
290 IF k$=CHR$(19) THEN GOSUB 3800
300 IF k$=CHR$(16) THEN ok=0
310 com=NOT (INKEY(21))AND NOT (rb)
320 WEND
330 CLG 0:col=15:x=320:y=200:fx=x:fy=y
340 GOSUB 1370:GOSUB 810:GOTO 80
350 IF k$="a" THEN GOSUB 2660
360 IF k$=CHR$(13) THEN GOSUB 2690
370 IF k$>"0" AND k$<"5" THEN GOSUB 2190:GOSUB 2580:GOSUB 1970:GOSUB 2540:GOSUB
2190
380 IF k$="p" THEN c1=col:GOSUB 1130:GOSUB 2700
390 RETURN
400 REM *** INITIALISE ***
410 MODE 0:CLG 0:ref$="1234":r$(1)="1":r$(2)="2":r$(3)="3":r$(4)="4"
420 GOSUB 660
430 POKE 46312,0:DEG:BORDER 0
440 KEY DEF 50,0:KEY DEF 38,0:KEY DEF 9,0:KEY DEF 68,0,221:KEY DEF 16,0,32,32,16
450 RESTORE 460:FDR i=49 TO 52:READ a,b:KEY DEF a,b:KEY DEF b,0:NEXT
460 DATA 13,64,14,65,5,57,20,56
470 DEF FN a(f)=INT(RND*2*f)-f:DEF FN a(c,f)=-ATN(f'/SQR(-f'+1))+90
480 ORIGIN 0,16,0,640,400,16
490 u$=CHR$(240):ds=CHR$(241):l$=CHR$(242):r$=CHR$(243):c$="s"
500 :ms=320:y=200:col=15:wa=15:sz=50:r=1:z=7:fx=x:fy=y
510 RESTORE 520:FDR i=0 TO 7:READ a,b:WINDOW #i,a,b,25,25:NEXT
520 DATA 1,20,2,4,6,8,10,10,14,15,12,12,17,20,19,20
530 FDR i=0 TO 7:PEN #i,15:NEXT
540 i$=CHR$(15)+CHR$(4)+"X Y S G P R "
550 SYMBOL 241,7,56,64,128,64,56,7,0:SYMBOL 242,224,28,2,1,2,28,224,0
560 SYMBOL 243,24,36,66,66,129,129,129,0:SYMBOL 244,24,36,66,66,66,36,24,0
570 SYMBOL 245,0,0,3,12,48,192,0:SYMBOL 246,0,126,66,66,66,126,0:SYMBOL 247
,255,129,129,129,129,129,255
580 com$=CHR$(15)+CHR$(15)+" R A T F "+CHR$(243)+" "+CHR$(244)+" "+CHR$(245)+"
"+CHR$(241)+CHR$(242)+" "
590 spe$="2":gra$="N"
600 col$="15":sp=6:ab=0:rb=0:com=0:mo=0
610 GOSUB 700
620 ul$=CHR$(15)+CHR$(4)+" :c1$=CHR$(15)+CHR$(0)+" "
630 FOR i=0 TO 15:pal$=pal$+CHR$(14)+CHR$(i)+CHR$(247):NEXT:pal$=CHR$(15)+CHR$(1
5)+pal$+CHR$(14)+CHR$(0)
640 RETURN
650 REM *** SET UP PALETTE ***
660 RESTORE 670:FDR i=0 TO 15:READ c:INK i,c:pal(i)=c:NEXT
670 DATA 0,1,2,4,6,8,9,10,12,13,14,16,18,20,24,26
680 RETURN
690 REM *** SET UP TABLES FOR sin , cos and arccos ***
700 DEG:FDR i=0 TO 72:s!(i)=SIN(i*5):c!(i)=COS(i*5):NEXT
710 FDR i=0 TO 99:as1(i)=FN a(c,i/100):NEXT
720 FDR i=0 TO 99:as2(i)=FN a(-i/100):NEXT
730 as1(100)=0:as2(100)=180:RETURN
740 REM *** CHANGE GRAPH. PRINT. MODE ***
750 SOUND 129,150,10,4:mo=mo+1:IF mo=4 THEN mo=0
760 gra$=MID$( "NXYAD",mo+1,1)
770 PRINT#5,gra$:
780 GOSUB 3970
790 RETURN
800 REM *** PRINT INFO LINE ***
810 PRINT i$:
820 PRINT#1,RIGHT$(" "+STR$(x),3);
830 PRINT#2,RIGHT$(" "+STR$(y),3);
840 PRINT#3,spe$:
850 PRINT#4,col$:
860 PRINT#5,gra$:
870 PRINT#6,ref$:
880 RETURN
890 REM *** DRAW PALETTE ***
900 PRINT
910 PRINT pal$:
920 PRINT#7,MID$(STR$(col),2)
930 LOCATE 18,1:PEN 4:PRINT#P;
940 RETURN
950 REM *** CHANGE SPEED ***
960 SOUND 129,150,10,4:r=r+1:IF r>2 THEN r=0
970 spe$=MID$("123",r+1,1):PRINT#3,spe$:
980 sp=#4+2
990 RETURN
1000 REM *** CHANGE INK OF SELECTED PEN ***
1010 SOUND 129,150,10,4:c=pal(col):LOCATE 18,1:PEN#6,4:PRINT#6,CHR$(13)+" I":
1020 PEN 0:LOCATE x1,1:PRINT CHR$(247);
1030 k$="":WHILE k$<>CHR$(13)
1040 PRINT#7,RIGHT$("0"+MID$(STR$(c),2),2);
1050 k$=INKEY$
1060 c=c+(k$=d$)-(k$=u$):IF c>26 THEN c=0
1070 IF c<0 THEN c=26
1080 INK col,c
1090 WEND:k$="":pal(col)=c
1100 LOCATE 18,1:PRINT#6,CHR$(13)+" P":PEN#6,15:PRINT#7,RIGHT$("0"+MID$(STR$(co
l),2),2);
1110 RETURN
1120 REM *** SELECT NEW PEN ***
1130 x1=col+1:x2=x1:k$=" ":SPEED KEY 30,5:GOSUB 900:pe=15:inv=15
1140 PRINT CHR$(22)+CHR$(1);
1150 PRINT#7,RIGHT$("0"+MID$(STR$(col),2),2);
1160 WHILE k$<>CHR$(13)
1170 inv=inv XOR 15:pe=pe XOR inv:LOCATE x1,1:PEN pe:PRINT CHR$(247);

```


PROGRAMS

```

1180 k$=INKEY$:x2=x1+(k$=1$)-(k$=r$):IF x2=0 THEN x2=16
1190 IF x2=17 THEN x2=1
1200 IF k$="c" THEN GOSUB 1010
1210 IF k$="r" THEN PRINT CHR$(7);:GOSUB 660
1220 col=x1-1
1230 IF x2<>x1 THEN PEN 15:LOCATE x1,1:PRINT CHR$(247);:PRINT#7,RIGHT$("0"+MID$(
STR$(x2-1),2),2);
1240 x1=x2:WEND
1250 col=x1-1:PRINT CHR$(22)+CHR$(0)
1260 SPEED KEY 20,8
1270 col$=RIGHT$("0"+MID$(STR$(col),2),2)
1280 IF ab=0 THEN PRINT CHR$(23)+CHR$(1);:PLOT fx,fy,wa:PLOT fx,fy,col
1290 GOSUB 3970
1300 wa=col:k$="":GOSUB 810:PRINT CHR$(23)+CHR$(mo)::RETURN
1310 REM *** UPDATE X and Y COORDS ***
1320 k$=INKEY$
1330 x=x+(k$=r$)*sp*2*(x<(640-2*sp))-((k$=1$)*sp*2*(x>2*sp-4))
1340 y=y+(k$=u$)*sp*(y<(384-sp))-((k$=d$)*sp*(y>sp-2))
1350 RETURN
1360 REM *** PRINT X and Y COORDS ***
1370 PRINT#1,RIGHT$(" "+STR$(x),3);
1380 PRINT#2,RIGHT$(" "+STR$(y),3);
1390 RETURN
1400 REM *** AIRBRUSH ROUTINE ***
1410 IF NDT(ab) THEN RETURN ELSE GOSUB 2190:WHILE ab
1420 GOSUB 1520
1430 k$="":WHILE k$<>CHR$(13) AND ab
1440 FOR i=1 TO 5
1450 PLOT x+FNa(sz),y+FNa(sz),col:NEXT
1460 SOUND 129,0,30,3,0,0,1
1470 GOSUB 1320:GOSUB 1370
1480 WEND
1490 SOUND 129,0,0,0:GOSUB 1370
1500 WEND:SPEED KEY 20,8:GOSUB 2190
1510 GOSUB 3970:RETURN
1520 k$="":SPEED KEY 10,2
1530 GOSUB 1680:WHILE k$<>CHR$(13) AND ab
1540 :1=x:y=y
1550 GOSUB 1320
1560 sz1=sz:sz=sz+((k$=CHR$(%F7))*2*(sz<150))-((k$=CHR$(%F6))*2*(sz>0))
1570 IF x1<>x OR y1<>y OR sz1<>sz THEN :2=x:y2=y:x=x1:y=y1:sz2=sz:sz=sz1:GOSUB 1
680:x=x2:y=y2:sz=sz2:GOSUB 1680:GOSUB 1370
1580 IF k$="p" THEN GOSUB 1130
1590 IF k$="g" THEN GOSUB 750
1600 IF k$="a" THEN ab=0
1610 IF k$="0" AND k$<"5" THEN GOSUB 1680:GOSUB 1970:GOSUB 1680
1620 IF k$="c" THEN GOSUB 960
1630 IF k$=CHR$(127) THEN GOSUB 2090:k$=""
1640 IF k$="f" THEN GOSUB 1730
1650 IF k$="r" THEN GOSUB 2010:k$=""
1660 WEND:GOSUB 1680
1670 SPEED KEY 1,1:RETURN
1680 PRINT CHR$(23)+CHR$(1);
1690 MOVE x$z,y$z:DRAW 0,2*sz,15:DRAW 2*sz,0:DRAW 0,-2*sz:DRAW -2*sz,0
1700 PRINT CHR$(23)+CHR$(mo);
1710 RETURN
1720 REM *** FILL IN SQUARE CURSOR ***
1730 GOSUB 1680:SOUND 129,150,10,4:FOR i=(y-sz) TO (y+sz) STEP 2
1740 MOVE (x-sz),1:DRAW 2*sz,0,col
1750 NEXT:GOSUB 1680
1760 GOSUB 3970
1770 RETURN
1780 REM *** DRAW FILLED ELLIPSE ***
1790 IF o2=0 THEN aa=0-180*(o1<0):GOTO 1840
1800 IF o1=0 THEN aa=90-180*(o2<0):GOTO 1840
1810 aa=ATN(o2/o1)
1820 IF aa<0 THEN aa=aa+180-180*(o2<0):GOTO 1840
1830 IF aa>0 THEN aa=aa-180*(o1<0)
1840 k=SQR(o1*o1+o2*o2)
1850 y1=0:bb=90+aa
1860 WHILE (y1/k)<1:bb=as1(100*y1/k)+aa
1870 x1=n1*%COS(bb)-n2*%SIN(bb)+fx:bb=-as1(100*y1/k)+aa:x2=fx+n1*%COS(bb)-n2*%SIN(bb)+
fx
1880 MOVE x1,y1+fy:DRAW x2,y1+fy,col
1890 y1=y1+2:WEND
1900 y1=-2:bb=90+aa
1910 WHILE (y1/k)>-1:bb=as2(-100*y1/k)+aa
1920 x1=n1*%COS(bb)-n2*%SIN(bb)+fx:bb=-as2(-100*y1/k)+aa:x2=n1*%COS(bb)-n2*%SIN(bb)+
fx
1930 MOVE x1,y1+fy:DRAW x2,y1+fy,col
1940 y1=y1-2:WEND
1950 RETURN
1960 REM *** CALL UP REFERENCE POINT ***
1970 k=ASC(k$)-48:IF r$(k)<>CHR$(246) THEN RETURN
1980 x=xr(k):y=yr(k)
1990 GOSUB 3970:RETURN
2000 REM *** SET UP REFERENCE POINT ***
2010 SOUND 129,150,10,4:WHILE (k$<"1" OR k$>"4") AND k$>"a":k$=LOWER$(INKEY$):W
END
2020 IF k$="a" THEN 2070
2030 k=ASC(k$)-48:IF r$(k)=CHR$(246) THEN RETURN
2040 SOUND 129,150,10,4:xr(k)=yr(k):y=yr(k):r$(k)=CHR$(246)
2050 ref$=r$(1)+r$(2)+r$(3)+r$(4)
2060 PRINT#6,ref$:
2070 GOSUB 3970:RETURN
2080 REM *** DELETE REFERENCE POINT ***
2090 rr=0:FOR i=1 TO 4:IF r$(i)=CHR$(246) THEN rr=i-1
2100 NEXT:IF NOT(rr) THEN 2170
2110 PRINT CHR$(7);:WHILE (k$<"1" OR k$>"4") AND k$>"a":k$=LOWER$(INKEY$):WEND
2120 IF k$="a" THEN 2170
2130 k=ASC(k$)-48:IF r$(k)<>CHR$(246) THEN RETURN
2140 PRINT CHR$(7);:r$(k)=MID$(STR$(k),2)
2150 ref$=r$(1)+r$(2)+r$(3)+r$(4)
2160 PRINT#6,ref$:
2170 GOSUB 3970:RETURN
2180 REM *** PLOT CURSOR AND F.P. ***
2190 PRINT CHR$(23)+CHR$(1);
2200 MOVE x-8,y:DRAW 16,0,15:MOVE x+8,y:DRAW 0,16
2210 PLOT fx,fy,col
2220 PRINT CHR$(23)+CHR$(mo);

```

AMSTRAD

CPC 464
CPC 664
CPC 6128

Software

WORD PROCESSING WITH AMSTRAD

The hardware features of Amstrad computers combined with the extensive facilities of Tasword word processors provide the ideal word processing system for both home and business users. Every Tasword comes complete with a comprehensive manual and a cassette or disc. A tutor program is included with the software to make learning easy and enjoyable.

TASWORD 464 \$49.50

A particularly sophisticated yet easy to use word processing program. "There is no better justification for buying a 464 than this program" — Popular Computer Weekly. Suits the Amstrad 464, 664, and 6128. Supplied on cassette.

TASWORD 464-D \$64.90

This advanced Tasword is specially developed to utilise the capabilities of the Amstrad 464 and 664 disc drives. Major new features include a powerful mail merge facility and printer streaming. Suitable for the 464 (with disc), 664 and 6128. Supplied on disc.

TASWORD 6128 \$69.00

The word processor designed to make best use of the Amstrad 6128. All the features of Tasword 464-D plus 64K text files. Supplied on disc.

TAS-SPELL \$48.50

A spelling check program for use in conjunction with Tasword 464-D and Tasword 6128. Supplied on disc.

TASPRINT 464 \$26.70

Allows the selection of 5 additional impressive print styles when using the Amstrad with any Epson compatible 8 pin dot matrix printer. Suits the Amstrad 464, 664 and 6128. Supplied on cassette.

TASCOPY 464 \$27.90

Provides high resolution screen copies for Amstrad computers. Includes a shading which presents on a monochrome scale the colours of the screen. For use with any Epson compatible 8 pin dot matrix printer. Includes provision for making poster size printouts. Suits the Amstrad 464, 664 and 6128. Supplied on cassette.

We have further enhancements for the Amstrad computer range. Send SAE for our catalogue.

Australian distributor:



dolphin computers pty ltd

Unit 2/7 Waltham Street, Artarmon, NSW 2064
Telephone: (02) 438 4933 Telex: ASS20668

At discerning computer shops or mail order from Dolphin. Airmail \$1.20, cert mail \$2.80, o/nite courier \$7.00. Enclose cheque/money order/Bankcard/Visacard/Mastercard details. All prices include sales tax. All products guaranteed.

★ ★ Dealer enquiries welcome ★ ★

MAILLIST

The simple way to store your mail lists to disk. Prints on standard size self adhesive address labels. (89mm x 24mm.) Add, change, delete files list on screen, sort by name or city. MAILLIST will do it all for you! User's guide included. Available for IBM PC and compatibles. SS/DD Disk.

BUDGET SOFTWARE

P.O. Box 316
Gawler S.A. 5118

YES! Please send me a copy of MAIL-LIST at only \$39.95. (Includes P+H.)
Cheque () Bankcard ()

Account No. 496

Signature

Valid from to

Name

Address

SOFTWARE FOR LAP COMPUTERS

NEC PC-8201A
Tandy Model-100
Olivetti M-10

- Integrated Software in 32K ROM for NEC PC-8201A Spreadsheet, database, wordprocessing, schedule all in one
- MPLAN Spreadsheet program
- JOURNALIST Wordstar compatible text formatter program
- Other programs available.

Call (02) 670 1610
SILICON CRAFTS

```

2230 RETURN
2240 PRINT CHR$(23)+CHR$(1);
2250 PLOT fx, fy, col
2260 PRINT CHR$(23)+CHR$(mo);
2270 RETURN
2280 REM *** SET POSITION OF F.P. ***
2290 GOSUB 2190:PRINT CHR$(23)+CHR$(1);
2300 fx=x:fy=y
2310 GOSUB 2190
2320 RETURN
2330 REM *** SELECT COMMAND ***
2340 LOCATE 1,1:sh=-1:z=15:PRINT com$;
2350 PRINT CHR$(22)+CHR$(1);:SPEED KEY 20,10
2360 GOSUB 2240
2370 WHILE sh AND k<>CHR$(13)
2380 LOCATE z,1:PRINT el$;
2390 k$=INKEY$
2400 z=z+2*(k$=CHR$(&F6) AND z>3)-2*(k$=CHR$(&F7) AND z<17)
2410 LOCATE z,1:PRINT ul$;
2420 sh=NOT(INKEY(21))
2430 WEND
2440 PRINT CHR$(22)+CHR$(0);
2450 GOSUB 2470:com=0:GOSUB 3970
2460 SPEED KEY 10,1:RETURN
2470 IF k$<>CHR$(13) THEN GOSUB B10:RETURN
2480 i=(z-1)/2:ON i GOSUB 2630,2510,3210,4000,3360,2770,2750,2890
2490 GOSUB B10:RETURN
2500 REM *** SWITCH ON AIRBRUSH ***
2510 ab=-1
2520 RETURN
2530 REM *** ROUTINES FOR DRAWING RUBBER BAND ***
2540 PRINT CHR$(23)+CHR$(1);
2550 MOVE x,y:DRAW fx, fy, col:ia=x:ya=y
2560 PRINT CHR$(23)+CHR$(mo);
2570 RETURN
2580 PRINT CHR$(23)+CHR$(1);
2590 MOVE xa, ya:DRAW fx, fy, col
2600 PRINT CHR$(23)+CHR$(mo);
2610 RETURN
2620 REM *** SWITCH ON RUBBER BAND ***
2630 rb=-1:GOSUB 2190:GOSUB 2540:GOSUB 2190
2640 RETURN
2650 REM *** SWITCH OFF RUBBER BAND ***
2660 rb=0:GOSUB 2190:GOSUB 2580:GOSUB 2190
2670 GOSUB 3970:RETURN
2680 REM *** FIX RUBBER BAND ***
2690 rb=0:GOSUB 2190:GOSUB 2580:MOVE xa, ya:DRAW fx, fy, col:GOSUB 2190:RETURN
2700 GOSUB 2190:MOVE x,y:PRINT CHR$(23)+CHR$(1);
2710 DRAW f, fy, cl:DRAW x,y, col
2720 GOSUB 2190
2730 RETURN
2740 REM *** LINE ROUTINE ***
2750 GOSUB 2190:MOVE fx, fy:DRAW ,y, col:GOSUB 2190:GOSUB 2290:RETURN
2760 REM *** CIRCLE ROUTINE ***
2770 PRINT"SOLID (Y/N)?:":WHILE k$<>"Y" AND k$<>"N" AND k$<>"A":k$=UPPER$(INKEY$):WEND
2780 IF k$="A" THEN RETURN
2790 solid=0:IF k$="Y" THEN solid=-1
2800 GOSUB 2190:d:=fx-x:dy=fy-y
2810 r1=SQR(d*d+dy*dy):MOVE fx+r1, fy:IF solid THEN 2840
2820 FOR i=1 TO 72:DRAW fx+r1*c!(i), fy+r1*s!(i), col:NEXT
2830 DRAW fx+r1, fy:GOTO 2870
2840 st=-r1:IF fy+st<0 THEN st=-fy
2850 fin=r1:IF fy+fin>383 THEN fin=383-fy
2860 FOR i=st TO fin STEP 2::i1=SQR(r1*r1-i*i):MOVE fx-x1, fy+i1:DRAW fx+x1, fy+i, col:NEXT
2870 GOSUB 2190:RETURN
2880 REM *** ELLIPSE ROUTINE ***
2890 PRINT:PEN 15:INPUT:"Ratio"ec$:solid=0
2900 ec$=UPPER$(ec$):k=INSTR(ec$, "S"):IF k>0 THEN ec$=MID$(ec$, 2):solid=-1:GOTO 2900
2910 f3=0:ec=VAL(ec$):IF ec<0 THEN ec=ABS(ec):IF NOT(solid) THEN f3=-1
2920 IF ec=0 THEN RETURN
2930 IF ec>999 OR ec<1 THEN RETURN
2940 IF f3 THEN GOSUB 3170 ELSE:sa=0:ea=72
2950 GOSUB 2190
2960 dx=x-fx:dy=y-fy:r1=SQR(dx*dx+dy*dy)
2970 IF dx=0 AND dy=0 THEN GOSUB 2190:RETURN
2980 r2=(ec/100)*r1
2990 IF dx=0 AND dy>0 THEN an=90:GOTO 3060
3000 IF dx<0 AND dy<0 THEN an=270:GOTO 3060
3010 IF dy=0 AND dx>0 THEN an=0:GOTO 3060
3020 IF dy=0 AND dx<0 THEN an=180:GOTO 3060
3030 an=ATN(dy/dx):IF dx<0 AND dy>0 THEN an=180+an:GOTO 3060
3040 IF dx<0 AND dy<0 THEN an=an+180:GOTO 3060
3050 IF dx>0 AND dy<0 THEN an=360+an
3060 n1=r1*COS(an):n2=r2*SIN(an)
3070 o1=r1*SIN(an):o2=r2*COS(an)
3080 IF solid THEN GOSUB 1790:GOTO 3150
3090 x0=n1*c!(sa)-n2*s!(sa)+fx:y0=o1*c!(sa)+o2*s!(sa)+fy
3100 MOVE x0, y0
3110 IF sa>ea THEN ea=ea+72
3120 FOR i=sa TO ea
3130 xn=n1*c!(i MOD 72)-n2*s!(i MOD 72)+fx:yn=o1*c!(i MOD 72)+o2*s!(i MOD 72)+fy
3140 DRAW xn, yn, col:NEXT
3150 GOSUB 2190
3160 RETURN
3170 PRINT:INPUT:"Start "sa:IF sa>359 OR sa<0 THEN 3170
3180 PRINT:INPUT:"Finish "ea:dif=(sa-ea):IF ea>359 OR ea<0 OR ABS(dif)<10 OR dif>350 THEN 3180
3190 ea=ea/5:sa=sa/5:RETURN
3200 REM *** PRINT TEXT ROUTINE ***
3210 GOSUB B10:GOSUB 2190:TAG#7
3220 y1=y-16:x1=x:SPEED KEY 30,2:GOSUB 3330
3230 k$="":WHILE k$<>CHR$(13)
3240 k$=INKEY$:IF k$="" THEN 3290
3250 GOSUB 3330:PLDT 700,0,col
3260 k=ASC(k$):IF k>31 AND k<127 AND x1<609 THEN MOVE x1, y:PRINT#7, k$:x1=x1+32
3270 IF k=127 AND x1>31 THEN x1=x1-32:MOVE x1, y:PRINT#7, " ";
3280 GOSUB 3330
3290 WEND
3300 TAGOFF#7:GOSUB 3330:GOSUB 2190

```


PROGRAMS

```

3310 SPEED KEY 20,8:RETURN
3320 REM *** DRAW TEXT CURSOR ***
3330 PRINT CHR$(23)+CHR$(1);:MOVE #1,y1:DRAW #1+32,y1,15:PRINT CHR$(23)+CHR$(mo)
;
3340 RETURN
3350 REM *** DRAW ARC ROUTINE ***
3360 PRINT:PEN 15:INPUT:"Angle " :an
3370 IF an<0 THEN an=ABS(an):f3=-1 ELSE f3=1
3380 IF an<5 OR an>355 THEN RETURN
3390 an=an/2:dx=(x-fx)*f3:dy=(y-fy)*f3:IF dx=0 AND dy=0 THEN RETURN
3400 GOSUB 2190
3410 a2=(SQR(dx*dx+dy*dy))/2
3420 IF an=90 THEN a3=0 ELSE a3=a2/TAN(an)
3430 IF dx=0 THEN a1=90-180*(dy<0):GOTO 3480
3440 IF dy=0 THEN a1=-180*(dx<0):GOTO 3480
3450 a1=ATN(dy/dx)
3460 IF dy<0 THEN a1=a1+180-180*(dx>0)
3470 IF dy>0 THEN a1=a1-180*(dx<0)
3480 r1=SQR(a3*a3+a2*a2)
3490 sa=90+a1-an:ea=90+a1+an
3500 IF f3=1 THEN a=x:b=y:a0=fx:b0=fy ELSE a=fx:b=fy:a0=x:b0=y
3510 x0=a-a2*COS(a1)+a3*SIN(a1)
3520 y0=b-a2*SIN(a1)-a3*COS(a1)
3530 MOVE a,b
3540 FOR i=sa TO ea STEP 5:DRAW x0+r1*COS(i),y0+r1*SIN(i),col:NEXT:DRAW a0,b0,col
1
3550 GOSUB 2190
3560 RETURN
3570 MODE 1:CALL %BC02:PEN 1:PAPER 0:CLS
3580 WINDOW 1,40,1,25
3590 KEY DEF 16,1,16,16,16:KEY DEF 9,1:CLS:SPEED KEY 35,2:PRINT " " :END
3600 REM *** LOAD IN NEW PICTURE ***
3610 PRINT:PRINT"<L>-LOAD , <A>-ABORT";
3620 WHILE INKEY$<>"" :WEND
3630 k$="" :WHILE k$<>"L" AND k$<>"A":k$=UPPER$(INKEY$):WEND
3640 IF k$="A" THEN 3780
3650 PRINT:GOSUB 2190
3660 LOAD:"
3670 OPENIN:"pal"
3680 FOR i=0 TO 15
3690 INPUT#9,pal(i)
3700 NEXT
3710 FOR i=1 TO 4
3720 INPUT#9,xr(i),yr(i),r$(i)
3730 NEXT
3740 CLOSEIN
3750 FOR i=0 TO 15:INK i,pal(i):NEXT
3760 ref$=r$(1)+r$(2)+r$(3)+r$(4)
3770 GOSUB 2190
3780 GOSUB 3970:GOSUB 810:RETURN
3790 REM *** SAVE CURRENT PICTURE ***
3800 PRINT:PRINT"<S>-SAVE , <A>-ABORT";
3810 WHILE INKEY$<>"" :WEND
3820 k$="" :WHILE k$<>"S" AND k$<>"A":k$=UPPER$(INKEY$):WEND
3830 IF k$="A" THEN 3960
3840 PRINT:SPEED WRITE 1:GOSUB 2190
3850 PRINT:PRINT " ** SAVING **";
3860 SAVE:"screen",b,49152,16384
3870 OPENOUT " :pal"
3880 FOR i=0 TO 15
3890 PRINT#9,pal(i)
3900 NEXT
3910 FOR i=1 TO 4
3920 PRINT#9,xr(i),yr(i),r$(i)
3930 NEXT
3940 CLOSEOUT
3950 GOSUB 2190
3960 GOSUB 3970:GOSUB 810
3970 WHILE INKEY$<>"" :WEND:k$=""
3980 RETURN
3990 REM *** INFILL ROUTINE ***
4000 DIM #1(15),#2(15),y(15),d(15)
4010 GOSUB 2190
4020 sx=#x:sy=y
4030 bg=TEST(x,y):d=2
4040 WHILE TESTR(-4,0)=bg AND XPOS>=0:WEND:x1=XPOS
4050 MOVE x,y:WHILE TESTR(4,0)=bg AND XPOS<640:WEND:x2=XPOS
4060 s=1:x1(1)=x1:x2(1)=x2:y(1)=y:d(1)=-d
4070 MOVE #1,y1:k$=INKEY$:IF k$="a" THEN s=0:GOTO 4150
4080 WHILE TESTR(4,0)<>bg AND XPOS<x2:WEND:x3=XPOS-4:IF #3=#1 THEN MOVE #1+4,y1:W
HILE TESTR(-4,0)=bg AND XPOS>=0:WEND:x3=XPOS
4090 IF (x1-x3)>4 THEN GOSUB 4180
4100 x1=x3:IF (x2-x1)<5 THEN 4150
4110 x3=x1
4120 MOVE #3,y1:WHILE TESTR(4,0)=bg AND XPOS<640:WEND:x3=XPOS:MOVE #1+4,y1:DRAW #3
4,y1,col
4130 IF ABS(x3-x2)>4 THEN GOSUB 4230
4140 x2=x3:y=y+d:IF y<0 OR y>383 THEN 4150 ELSE 4070
4150 IF s=0 THEN ERASE #1,#2,y,d:x=sx:y=sy:GOSUB 2190:RETURN
4160 #1=#x1(s):x2=#x2(s):y=y(s):d=d(s):s=s-1:GOTO 4070
4170 RETURN
4180 y1=y-d:MOVE #1,y1
4190 WHILE TESTR(-4,0)<>bg AND XPOS>x3:WEND:x4=XPOS
4200 IF x4=x3 THEN RETURN
4210 IF s<15 THEN s=s+1:x1(s)=x3:x2(s)=x4+4:y(s)=y1:d(s)=-d
4220 RETURN
4230 IF SGN(x3-x2)=1 THEN x4=x2:x5=x3:y1=y-d ELSE x4=x3:x5=x2:y1=y
4240 MOVE #4-4,y1:WHILE TESTR(4,0)<>bg AND XPOS<x5:WEND:x4=XPOS
4250 IF x4=x5 THEN RETURN
4260 IF s<15 THEN s=s+1:x1(s)=x4-4:x2(s)=x5:y(s)=y1:d(s)=5GN(x2-x3)*d
4270 RETURN
4280 REM *** ERROR HANDLING ROUTINE ***
4290 IF ERR=7 THEN mem=FRE(""):PRINT CHR$(7);:RESUME
4300 IF ERR=25 THEN PRINT"INCORRECT FILE"CHR$(7);:FOR i=1 TO 2000:NEXT:RESUME 37
70
4310 MODE 1:CALL %BC02:PEN 1:PAPER 0:CLS
4320 WINDOW 1,40,1,25
4330 KEY DEF 16,1,16,16,16:KEY DEF 9,1:CLS:SPEED KEY 30,2
4340 PRINT"ERROR NUMBER "ERR" IN LINE "ERL
4350 END

```

APC is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs please include a cassette or disk version of your program, brief but comprehensive documentation, and a listing on plain white paper — typed if you have no printer. Please ensure that the software itself, the documentation and the listing are all marked with your name, address, program title, machine (along with any minimum requirements) and — if possible — a daytime phone number.

Check through the previous Program listings to see the kind of programs we prefer. As a rough guide, original ideas are always welcome, as are good implementations of utilities and applications. Obviously the programs should be well-written, easy to understand, and preferably not too long (remember that other readers have to type them in).

All programs should be fully debugged and your own original, unpublished work. We prefer to receive programs with a maximum 80-column width printed in emphasised typeface. We will try to return submissions if they are accompanied by a stamped addressed envelope of the appropriate size, but please keep a copy of everything. Programs are paid for at the rate of \$20 per page of published listing. Programs APC, 215 Clarence Street, Sydney 2000.

Memo from Marketing

To: Technical Director,
Aussie Personal Computers (Sales) Pty Ltd
Re: The Top Secret 1986 range

NOT NOW VERY CONFIDENTIAL AT ALL

Now look, you know me. My life is not going to be ruined by reading about our new product range in some rag that can't work out whether to be the Saturday Herald or the Socialist Worker, even if the few thousand illiterates who stray beyond the job ads could manage to figure out the typically impenetrable prose.

However, the fact that one of your troglodytes has escaped from the R&D Lubyanka for long enough to open his tusks in the hearing of some sweaty hack is disturbing. Have you no measure of control down there?

At least in Marketing Towers the minions know which side their bread is buttered and tug their forelocks at the right time. So do the hacks, come to mention it. One can normally channel some anodyne corporate comment into the computer press if you dress it up with enough vodka and vintage port.

So it is news to me that our entire product range is being made obsolete in the near future, or, to quote the hack's unnamed source, 'as soon as those Andrew Peacock clones in marketing extract the digits.' My impression, when I last set out on an awareness tour in the bowels, was that we had carefully banned R&D from getting any electronics catalogues later than 1977 so as to avoid making the IBM PC look silly.

So what is all this about bit-mapped screens, windows, mice and other figments of the intelligentsia? What does your Brainiac clone mean by 'a user interface that will put Apple into brown trousers'?

I realise, of course, that as technical director you can't be expected to keep your finger on every activity underground, any more than your uncle can pretend to be chairman much longer before anno domini removes the last vestiges of humanity.

Nevertheless, a little less of the ivory tower and a little more of the galley master would not come amiss. Otherwise I will be out there trying to sell the troglodytes' latest wonderbox to a public whose idea of a user interface is some liveried flunky to type in the stuff for them.

If you've got a dog, the chorus will go up from boardrooms round the nation, why bark yourself?

If you have a secretary, the second verse will rise, what are you doing with a keyboard on the desk?

If I had a mouse on my desk I would hit it with a handy nine iron, would come the jubilant coda, and our name would be a laughing stock wherever money shouts.

No the business microcomputer market in Australia is no place to sell real computers that are actually usable.

Of course, the prospects of the Gigabox 2000 would be good among the trainspotters in commando suits who labour late into the night making a Spectrum emulate a mainframe and the

Commodore 64 emulate a decent computer. These people, even more than some of your wilder staff, could do with a set of handcuffs and a bit of Moonie de-programming before removal to a padded cell full of virtual memory, whatever that may be.

But poverty-stricken poxy programmers who would rather write a word processor than buy one are no way to bump the profit curve off the sea bed.

On a happier subject, I understand that some of the more compos mentis of your lads have managed to slow down a design enough to pass as an IBM AT. All we need now is to cut down the reliability, and we could just have a goer in the typewriter replacement market. Perhaps multi-user typewriters, who knows?

Meanwhile, a little touch of the lash in the labs could help. And let's leave the press to the professionals, shall we? I've got a couple of editorial pages booked in March, along with some up-the-nose fish-eye snaps of the MD with the chairman propped up at his desk.

Yours from the front line,
James

END

DEERMONT DESIGNS

ARE YOU AMAZED BY THE NEW MACINTOSH PLUS?

Well that's only the start! We stock a range of peripherals that complement this superb machine to it's fullest.

Take our **DataFrame20™** for example. Just plug this external 20 Mgb Hard Disk into your new MacPlus and fly with Apple's innovative Turbo File System. Self boot in seconds, literally. Programs that used to take 40 and 50 seconds to access, now are almost instantaneous. Standards and ratings are the highest in the industry.

If you already have a good old Mac, don't despair! We can upgrade you with our new **Enhance™** board (available 15th March). We give you all the features of the Macintosh Plus, plus (mind the pun!) 2Mgb of RAM, upgradable to 6.6Mgb! (compared with 2Mgb, upgradable to 4Mgb — offered by Apple) and, believe it or not, our board runs twice as fast as the original Mac Plus!

If you don't want to upgrade but would still like the option of the super access speeds that the new Mac has to offer — then we can install our 20Mgb internal **SuperDrive™** in your old Mac. Service is no worry, this is a single unit, plug in drive that is removable in minutes. Being clip-on it doesn't infringe on your Apple Warranty. Shock ratings of 40g's+ guarantee that your Mac casing will crack before you damage your disk, so there's no worry about throwing your Mac in it's familiar tote bag.

Incremental back-up, fileserving software and other utilities are available for both the DataFrame and SuperDrive Hard Disks. Streaming Tape back up will be available late March.

If you would like more information on the above products or the rest of our comprehensive, solely Macintosh range of peripherals and software — contact your Apple dealer or call:

DEERMONT DESIGNS

P.O. Box 296, St Kilda 3182. Phone: (03) 528 5379

P.S. If we still haven't ceased to amaze you, wait till you've heard our prices!!!



S.A.M. The Smart Answering Machine

Transform your IBM or compatible into an intelligent phone management system.

Besides being a conventional phone answering machine SAM also

- Allows up to 999 separate personal messages to be retrieved individually by callers.
- Message forwarding
- Call screening
- Record messages in digital form on your floppy or hard disc which also means random access to your messages
- Phone book for 250 numbers with easy one key stroke dialling in tone or pulse
- Remote access allowing all the functions including information regarding time of call
- Easy to install, simply plug SAM interface card into a spare expansion slot of your PC and connect to phone line
- Many other features like timed message deliver, group deliver etc.

R.R.P. \$899 including tax

VoiceCommand

Voice recognition for IBM or compatibles

- The latest in voice recognition from USA. 32,000 word vocabulary in 500 word instant recognition segments
- Easy to install, simply plug the interface in spare expansion slot
- Voice and keyboard inputs can be mixed
- Can be used in any application program such as data bases, word processing etc.
- Allows multiple users. Voice can be used to input data or execute any amount of complex key stroke sequences

Applications:

- Perfect tool for people with manual disabilities like RSI
- Increases productivity where operator can use hands for other tasks while instructing computer
- Medical and dental fields etc. etc.



R.R.P. \$1900 including tax

**We also supply software and hardware for IBM, Apple, NEC, Macintosh, Toshiba, etc. at best prices!
Here Is A Small Example**

IBM

	R R P	OUR
Open Access	678	625
DB II	678	479
Multimate 3.31	745	550
Wordstar 2000+	795	479
Crosstalk	249	165
Lotus 123	845	549
Clipper Compiler for DBIII	995	749
Gem Draw inc Desktop	360	295
Framework II (latest)	1095	749

HARDWARE

	R R P	OUR
Modem 300 8aud Full Duplex/Viatel 1200/75 including soft/w	999	379
Mountain 20 meg Hard Disc on Plug-in Card	2175	1809

PRINTERS

	R R P	OUR
Epson LX80	569	469
Dilympia NP165	650	485
NEC P3	1499	1159
Toshiba 1340	1200	859
APPLE II, II+, IIE, CPM Card with 64K, 80 Column Simulation 6 Mhz, DR Software, Manuals, made in USA!		
	\$69.00	including tax

COMPUTERS

		inc. tax.
Olivetti M24 640k, 2 x 360 Drives		\$3850
Olivetti M 24 Hardisk		\$4849
NEC APC III		FR \$3349
Dsborne 16 bit Lap Portable		FR \$2200
Atlantis IBM compatible 640K, Multif. Col Graph, Clock Card, Serial-par ports.		FR \$1900
Toshiba T1100 laptop with sys. disc and manual set and recharger		\$2799

All our software is supplied from the Australian Distributor with Full Registration.

We DO NOT sell Greymarket Software or Hardware

For all your software and hardware needs, at the lowest prices, with full support and guarantee



Brainstorm

COMPUTER WAREHOUSE

**FOR ORDERS CALL
(02) 212 1622
MAIL VIATEL TO: 221216220
See Viatel List On *2489#**

All prices subject to change without notice. Delivery Extra.

405-411 Sussex St., Sydney, 2000. P.O. Box K109, Haymarket.



Logitec FT5002 Printer

See the Near Letter Quality (NLQ) of this dot matrix printer. Compare the speed, features, and price with the Epson LX100 . . . and you will choose the Logitec FT5002.

FT5002 includes:

- 120 characters per second
- 1 kilobyte buffer
- Near Letter Quality (NLQ)
- Downloadable characters
- Friction + tractor



only \$475 inc.



Logitec FT5100 Printer 180cps, NLQ

This printer means business! A heavy duty, fast 180cps printer with NLQ on 10 pitch, 12 pitch and proportional. Push tractors and 7K buffer as standard.

Definitely the best printer in its class and we ask you to compare it to the Epson FX-80. No comparison. Most importantly . . . it is called Logitec!



only \$695 inc.



Skai-130

Following in the great tradition of the DT-80 and DT-100, the Skai-130 offers the same legendary reliability at 130 characters per second.

Skai-130 includes:

- 130 characters per second, IBM compatible
- 10 pitch, 12 pitch, proportional, many more
- Graphics (IBM)
- 2K inbuilt buffer



only \$375

MAIL ORDERS • Send Cheque/Postal Order, or Bankcard details
PHONE ORDERS to:

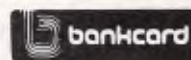
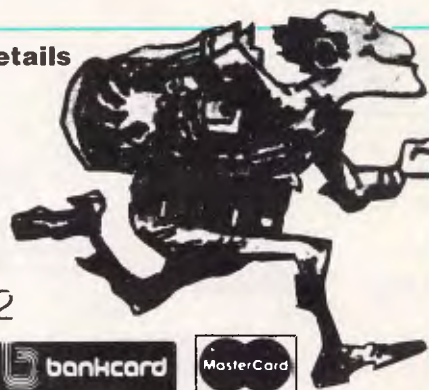
(03) 534 0994

BENSON Computers

177 BARKLY STREET, ST. KILDA. Vic. 3182
(NEW LARGE SHOWROOM)

Toll Free orders only — 008 33 4854

6 MONTHS WARRANTY ON ALL PRODUCTS



DEALER ENQUIRIES WELCOME

We have many hardware and software products not shown here.
Please phone for more information – (03) 534 0994.

ADVERTISERS INDEX

A	Advance Peripherals..... 16	E	Edcon..... 148	Micropro..... 126
ACT..... IBC	F	Fagan Microsystems... 134,138,174,175	Fairstar Electronics..... 45	Microtrix..... 178
AED..... IFC,1	Fielden Computer Services..... 153	Fujimex..... 122	G	Minicom..... 42
Anitech..... 84	G	Gametronics..... 111	N	National Cad Solutions..... 117
Archives Australia..... 57	H	Hewlett Packard..... 7,9,62,63	P	Perfect Information..... 39,43
Archive Computer Services..... 108,167	High Technology..... 30	Hi Tech Software..... 114	Porchester..... 192	Practical Solutions..... 116
Arcom Pacific..... 22,96	Intelligent Systems..... 20	Hypec Electronics..... 179,181	Professional Personal Computing..... 137	Q
ASP Microcomputers..... 144	I	IMA Computers..... 129	Qubie..... 14,15,48	R
Atlantis International..... 100	Information Solutions..... 55	Information Unlimited..... 64	R	Rob's Computer Centre..... 88,89
ATS..... 140	Intouch Australia..... 83,85,87	J	Rod Irving Electronics..... 59	Roland Australia..... 4
Australian Exhibition Services..... 19,53	K	Jomar Books..... 155	S	Seahorse Computers..... 25
AWA..... 77	KCM Computers..... 40	L	Select Software..... 130	Software Source..... 124
B	Kent Design..... 180	Logical Solutions..... 29	Software Specialists..... 173	Software Suppliers..... OBC
Bayne & Trembath..... 172	Kinetic Systems..... 92,93	Logi-Com..... 153	Starcard..... 102	Stemwriter..... 143
Benson..... 190,192	Koolan Emporium..... 183	Logitech..... 10,11	Sola Australia..... 81	T
Brainstorm..... 189	Kowhai..... 153	Lysco..... 150	Tallgrass Technology..... 44	The Bit Shop..... 112
Brother..... 66	M	Mac Clinic..... 24	The Computer Trader..... 64,86	The Great Eastern Software Co..... 182
BusStop Computers..... 129	Mace Reel..... 144	Marque Computing..... 81	U	Utilico..... 155
C	Memorex..... 50,51	Micro EDP & Hardware..... 176	V	Valrian Enterprise..... 17
CAE Electronics..... 118	Micro Educational..... 74,75	Micro General..... 31	Viatel Computers..... 155	Video Technology..... 120
Calcutronic..... 129	N	National Cad Solutions..... 117	V Software Z..... 180	W
Caulfield Typewriter Service..... 172	O	Office Systems..... 102	Wilbro Print..... 166	Word Works..... 128
Cerebral Solutions..... 70	P	Perfect Information..... 39,43		
Chambers..... 147	Q	Qubie..... 14,15,48		
Chendai..... 80	R	Rob's Computer Centre..... 88,89		
Choice Computers..... 125,127	S	Rod Irving Electronics..... 59		
Choice Systems..... 144	Seahorse Computers..... 25	Roland Australia..... 4		
Command Glen..... 156	Select Software..... 130			
Commodore..... 65	Software Source..... 124			
Compak Computer Centre..... 121,123	Software Specialists..... 173			
Compsoft Australia..... 47	Software Suppliers..... OBC			
Compushack..... 79	Starcard..... 102			
Computer Haven..... 133	Stemwriter..... 143			
Computer Print and Paper..... 191	Sola Australia..... 81			
CPM..... 149	T			
CPU Plus..... 12	Tallgrass Technology..... 44			
C-Tech..... 177	The Bit Shop..... 112			
D	The Computer Trader..... 64,86			
Database Network..... 60	The Great Eastern Software Co..... 182			
Dataparts..... 91,95	U			
Data Sat..... 142	Utilico..... 155			
Deermont Design..... 188	V			
Desktop Publishing..... 150	Valrian Enterprise..... 17			
Discware..... 34,35	Viatel Computers..... 155			
	Video Technology..... 120			
	V Software Z..... 180			
	W			
	Wilbro Print..... 166			
	Word Works..... 128			

Computer Paper

IN MINI & MICRO PACKS AVAILABLE FROM LEADING
COMPUTER STORES NOW

11 x 9 1/2/70 WORD PROC. PAPER

W250 Pack — \$7.85
W500 Pack — \$15.39
W1000 Pack — \$29.50
Also available in boxes of
2,000 & 2,500

A4 WORD PROC. PAPER

A4 250 Pack — \$8.28
A4 500 Pack — \$18.20
A4 1000 Pack — \$35.80
Also available in boxes of 2000

11 x 15 PLAIN OR B.H.S.

LP 250 Pack — \$8.45
LP 500 Pack — \$16.60
LP 1000 Pack — \$31.50
Also available in boxes of 2,500

COMPUTER ADDRESS LABELS

37 x 102 — 2000 Labels — \$35.00
24 x 89 — 2000 Labels — \$23.15

Also available in boxes of
10,000

COMPUTER BINDERS

11 x 9 1/2 — \$3.60
11 x 15 — \$3.65

For
Quality
Computer Paper
Look For
This Label

PHONE (03) 584 5488

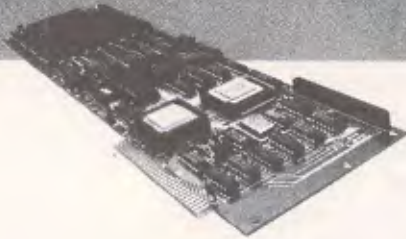
DEALER ENQUIRIES WELCOME

96B Herald Street,
Cheltenham 3192

All prices R.R.P.

(Also pre printed STD inv/stat formats. All prices include S.T. — Plus packing & postage)

PCturbo 186™

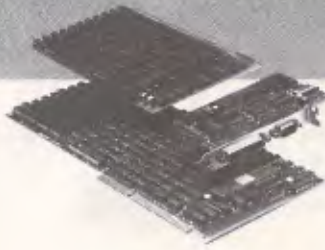


PCturbo 186—The Performance Standard
To meet today's productivity needs, Orchid offers the PCturbo 186 Processor Card. Plugged into your IBM PC or XT, the PCturbo supercharges computer performance 200% to 400% over its current speed. The PCturbo accomplishes this by adding an ad-

vanced 80186 micro-processor, running at an 8 MHz clock speed, to the 8088 you already have in your PC. While the 80186 runs your software faster, the 8088 handles all the peripherals attached to your PC, literally giving you two computers in one chassis.

Turbocharge your IBM PC/XT

ECCELL™



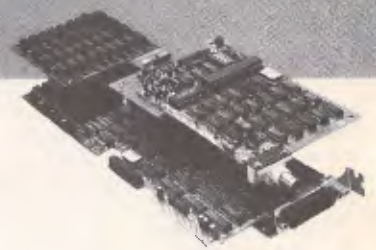
ECCELL is the only board of its kind for the IBM PC AT and compatibles. Its most unique feature gives ECCELL its name. ECC (Error Correction Code) insures against memory errors that would "crash" your system by actually detecting and correcting memory errors. Only ECCELL can protect you from the PARITY

CHECK 2 error that would destroy your data and cost you valuable time.

ECCELL also makes your life easier because of its "switchless" installation. Setting up and installing the board takes only a few minutes thanks to the intelligent menu-driven installation program.

3Mb Multifunction for IBM-AT

Conquest™



Designed especially for the IBM PC and compatibles, the Conquest effectively replaces three ordinary expansion boards—you can get a multifunction board, an Expanded Memory board, and a PCnet board all in one.

Like all the other memory/multifunction boards in

the Orchid family, it supports the Lotus/Intel Expanded Memory Specification with up to 2 megabytes of RAM memory. Multiple boards may be used for a total of up to 8 megabytes. A serial port, parallel port, and clock/calendar are included.

2Mb Multifunction for IBM PC/XT

CramRAM™

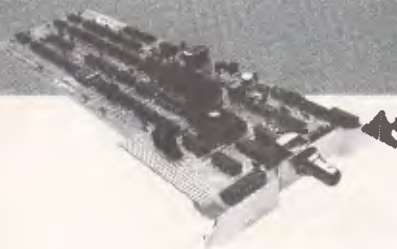


Only Orchid could incorporate the most advanced packaging technology to bring you 2 megabytes of RAM in a half-length card. Now you can use that short slot in an XT for a CramRAM board. You can bring your system up to 640K and get Lotus/Intel Expanded Memory Specification capability, all with the same board.

Orchid used the latest Single In-line Packaging (SIP) and Surface-Mount Technology (SMT) to pack 2 megabytes of memory in a board this compact. You can install multiple boards for up to 8 megabytes of memory.

2Mb short-slot Ram board

PCnet™



The First PC Network.
Orchid Technology created PCnet, the first Local Area Network for the IBM PC and compatibles. Today, PCnet is recognized as the leader in low-cost networking for the PC with over 50,000 nodes installed. No other company offers the same price/performance value that we do.

Small wonder that Orchid's PCnet has gained such tremendous acceptance. By providing the ability to share expensive peripherals among a number of users, devices such as high capacity hard disks, laser printers, and plotters become far more cost-effective.

Network for IBM PC/XT/AT

PCnet/Advanced NetWare™

PCnet/Advanced NetWare
If your networking needs require more powerful capabilities and higher performance, Orchid now offers Advanced NetWare. This widely acclaimed network operating system software is designed from the ground up to handle the specialized computing

needs of a Local Area Network system. Outstanding performance and comprehensive security are the chief benefits of Advanced NetWare for the more sophisticated network user. For current users of the standard PCnet software, Advanced NetWare offers an ideal upgrade path as their networking needs grow.

PCnet/Advanced NetWare Benchmark Tests

Time In Seconds (with 4 users)	PCnet/Advanced NetWare	3Com Etherlink	IBM PC Network
100K file save	70	318	330
512 byte write	143	1262	272
100K file copy	37	230	48

High Speed network system

“Who now distributes ‘Orchid’ in Australia?”

“Porchester Computers Pty. Ltd.”

“That’s great news!”

It is great news too!

Both Porchester and Orchid Technology are pleased to announce that Porchester are now the Australian distributors for ‘Orchid’ products.

This means that you can now get the support that you want, and deserve, on this important range of upgrade products for your IBM PC/XT or AT. Fast delivery, service, and assistance is available simply by telephoning.



The products shown above are a sample of the Orchid range and are certainly worthy of installation in your IBM or compatible, including Canon, ITT, Olivetti, Logitec, etc.

Sold by:

Computerland Stores

Major dealers Australia wide

For further information:

Porchester Computers Pty. Ltd.

177 Barkly Street, St. Kilda, Vic. 3182

Phone (03) 537 2722

ANOTHER HARD ACT TO FOLLOW!

act

**FIXED REMOVABLE
WINCHESTER DISK SYSTEM**

MADE IN AUSTRALIA



Act's fixed removable disk systems give you MEGABYTES IN THE PALM OF YOUR HAND

COMPATABILITY

No matter which micro you have, you can make it ACT. The ACT fixed removable winchester is compatible with most micros —

- APPLE I & IIE • COLUMBIA P.C.
- CORONA/WORDPLEX • DEC RAINBOW 100
- HEATH/ZENITH H89/Z89 • HITACHI PEACH
- IBM P.C. • KAYPRO • MICROBEE
- MORROW MICRO-DECISION • NEC APC
- NORTHSTAR ADVANTAGE & HORIZON
- OSBORNE I & EXECUTIVE
- SANYO MBC-1000 & 555 • SIGMA/OKI MODELS 20 & 30
- SIRIUS • SUPERBRAIN I/II
- TANDY II & III • TIME OFFICE
- TOSHIBA T-300 • XEROX 820
- PANASONIC JB-3001 • AND OTHERS.

A GREAT STORAGE SYSTEM

Combine the best of two storage systems — the speed and capacity of a hard disk and the mobility of a floppy. You can backup the days data, remove the disk and store it safely or carry it interstate in your briefcase — a great storage system!

AUSTRALIAN

You don't have to pay more to buy Australian!

ACT is manufactured in Australia and supported by an Australian organisation committed to backup support and service. It's a professional ACT.

A DIVISION OF AUSTRALIAN PROTECTION INDUSTRIES

act

Australian Computer and Telecommunications
75 Willoughby Road, Crows Nest, NSW 2065.
Telephone 02 439 6300, Telex AA 24816

DISTRIBUTORS.

Direct Data, 1357 Malvern Road, Malvern, Victoria 3144. Telephone (03) 209 9045.

Computer Mart, 356A King William Street, Adelaide, South Australia 5000. Telephone (08) 51 5363.

These are some of our compatibles



In fact Open Access is compatible with more than 25 of the worlds most popular microcomputers.

Open Access is the popular integrated do-it-all super program that can perform virtually every task you're ever likely to encounter.

Open Access includes an electronic spreadsheet, 3D business graphics, word processor, appointment scheduler and telecommunications module, all revolving

around the powerful information manager.

Open Access operates on the following MS/PC DOS microcomputers:

AT&T, Challenger, Chamellion, Columbia, Compaq, Corona, Datamax, Data General, Digital Rainbow, Eagle, Emtek, Hewlett-Packard, Hyperion, IBM, ITT Extra, Monroe, NCR, NEC, Olivetti, Pantek, Philips, President, Sigma, Sperry, Tandy, TeleVideo, Toshiba, Texas Instruments, Wang, Zenith.

O·P·E·N ACCESS

Produced, distributed and supported in Australia by:

S SOFTWARE
SUPPLIERS

7 Avon Road, North Ryde, NSW 2113.
Telephone (02) 888 1955. Telex AA 75364

State Distributors

Brisbane (07) 345 2411 Canberra (062) 49 7915 Melbourne (03) 598 4522 Perth (09) 481 0073 Adelaide (08) 219 4615